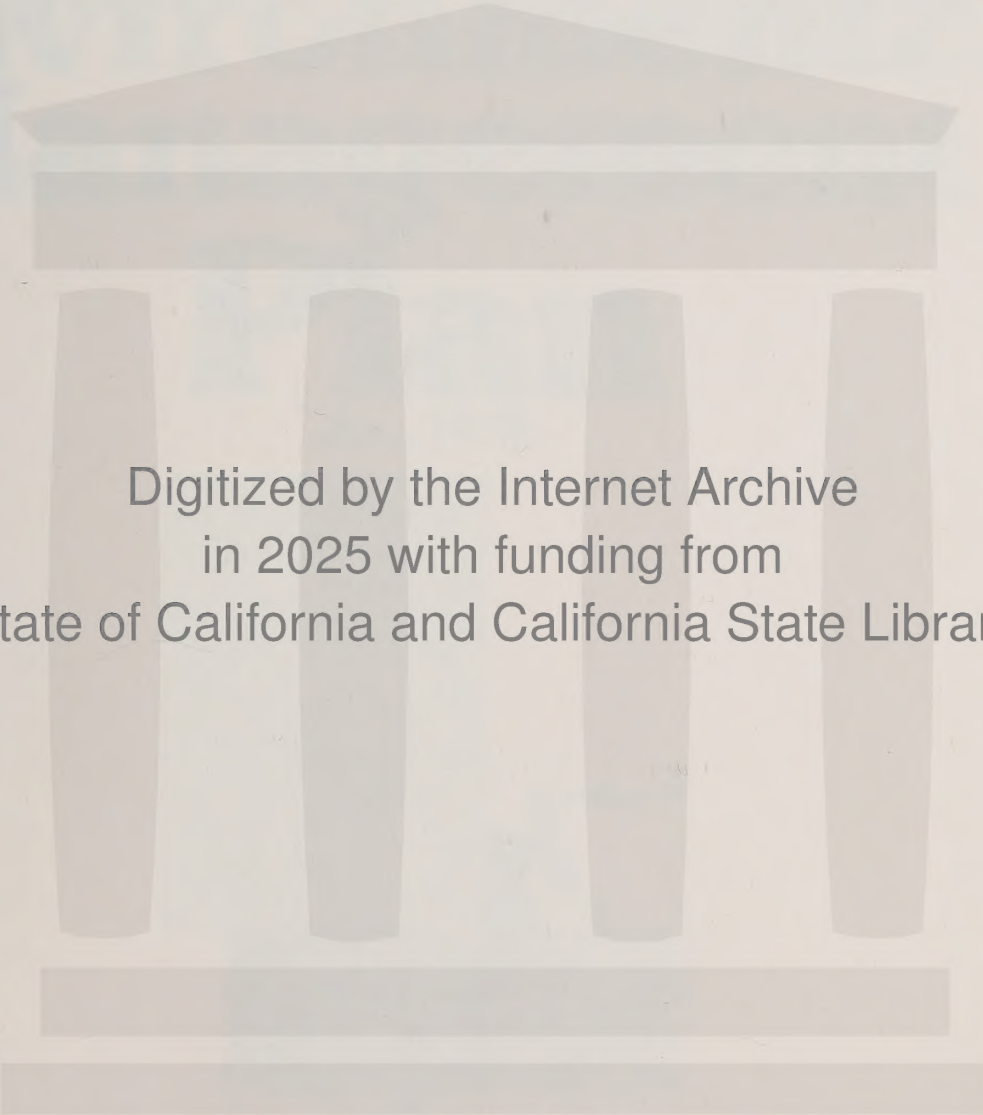


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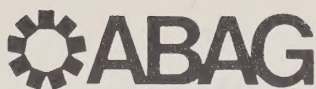
San Francisco Bay Area

Environmental Management Plan

June 1978



This plan was prepared by the Association of Bay Area Governments with a grant and other assistance from the Environmental Protection Agency, in cooperation with Bay Area Air Pollution Control District, Metropolitan Transportation Commission, San Francisco Bay Regional Water Quality Control Board and Counties of the Bay Area with assistance of these agencies: ■ Army Corps of Engineers ■ California Air Resources Board ■ California Department of Health ■ California Department of Transportation ■ Council of Bay Area Resource Conservation Districts ■ Governor's Office of Planning and Research ■ Lawrence Berkeley Laboratory ■ Lawrence Livermore Laboratory ■ San Francisco Bay Conservation and Development Commission ■ State Water Resources Control Board ■ State Solid Waste Management Board ■ Wastewater Solids Study



Association of Bay Area Governments

Hotel Claremont • Berkeley, California 94705 • (415) 841-9730

June 12, 1978

Hon. Edmund G. Brown, Jr.
Governor, State of California
State Capitol
Sacramento, CA 95814

Dear Governor Brown:

In accordance with the Federal and State statutes described therein, the Association of Bay Area Governments is pleased to submit for your endorsement, and transmittal to the Environmental Protection Agency, the Environmental Management Plan (EMP) for the Bay Area.

The plan is a complex and integrated document, encompassing air quality, water quality, water supply and solid waste. It was compiled over the past two years, with the assistance of many public bodies (including the Bay Area Air Pollution Control District and the Metropolitan Transportation Commission), at a cost exceeding \$4.3 million, in addition to several thousand hours of uncompensated overtime. It has involved an unprecedented degree of public participation: ranging from top-level guidance by a 46-member task force representing (among others) business, labor, environmentalists, urban and rural minorities and local governments, to several hundred round tables, meetings and formal public hearings. There have been more than 1,500 pages of public comments and proposed revisions.

As you know, attainment and maintenance of the necessary Federal and State standards for air, water and solid waste in a region such as the Bay Area is an immensely difficult, complicated and frequently controversial task. It is our firm opinion that the enclosed plan meets the mandate of Federal and State law. In the process, we have been obliged to accept all standards as given, without assessing their wisdom or efficacy. In the case of air quality, our experience has led us to believe that there may well be significant economic and social adjustments, and to request Congress to re-examine the "no-risk" philosophy and requirements of the Clean Air Act to make them reasonable for local governments seeking to comply. This statement is especially true with regard to heavy industrial sources seeking to locate in the region.

To reach the applicable standards, we have had the benefit of sophisticated modelling techniques apparently not yet available in other metropolitan areas of the country. We are particularly anxious, nonetheless, in the matter of air quality, that it be fully appreciated that considerable uncertainty necessarily exists.

An extremely broad range of possible actions was considered in order to reach the relevant standards. After thorough analysis, many were eliminated as either ineffective or inappropriate, while others, of course, have been

Representing City and County Governments in the San Francisco Bay Area

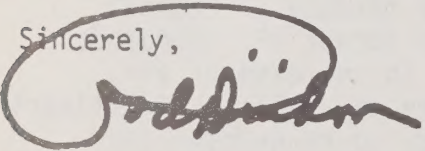
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found effective and are included. Achieving a mix of controls which allow attainment and maintenance of the standards, while at the same time being politically acceptable, was of course an exceedingly difficult task, whose magnitude could be discerned only by experience, as we and the news media discovered. As you know, the most controversial recommendation considered was that of land use controls for maintenance of air quality after 1985-87. After many months' discussion, and the expression of substantial concern by labor, business and many of our member governments, the proposal was excluded from the EMP by the Task Force and the Executive Board. In the process, a number of valuable questions were raised, including the Federal-State-local relationship, the social and economic impact of such controls, the degree of air quality improvement likely to be obtained, and the suitability of including these controls in an air quality plan.

The Association of Bay Area Governments will continue to bear a major responsibility, under appropriate Federal and State statutes, regulations and designations, as this region reaches and maintains all necessary standards for air quality, water quality and solid waste as provided in this plan and its continuing planning process. In the work to be undertaken during this phase of the Environmental Management Plan, we shall pay particular attention to the need to reassess the plan based upon the firm conviction that continued economic growth is as vital to our citizens as their health and environmental protection. Each year the General Assembly will receive a status report on compliance with all applicable Federal and State air quality, water quality and solid waste standards and regulations in metropolitan areas of California and the nation. If it is demonstrated that Federal, State and local governments are not taking all reasonable steps to ensure equitable administration and enforcement of such standards and regulations, ABAG staff shall make recommendations to the Executive Board and General Assembly for modifying control measures of the Environmental Management Plan. It is a primary concern that these standards and regulations be equitably enforced in the nation.

Like your own, our aims are high and our burden substantial. We need your cooperation and understanding, and we pledge ours in return.

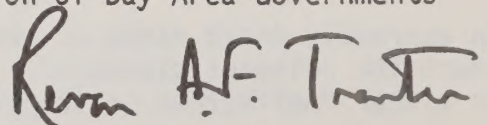
Sincerely,



Rod Diridon, President
Supervisor, Santa Clara County

cc: State Water Resources Control Board
California Air Resources Board
Solid Waste Management Board
Office of Planning and Research
Department of Health Services

Approved by the General Assembly of the Association of Bay Area Governments
June 10, 1978.



Revan A.F. Tranter
Secretary-Treasurer

ASSOCIATION OF BAY AREA GOVERNMENTS

GENERAL ASSEMBLY RESOLUTION NO. 2-78

ADOPTION OF THE ENVIRONMENTAL MANAGEMENT PLAN
FOR THE SAN FRANCISCO BAY REGION

- WHEREAS, pursuant to various Federal and State environmental laws the Association of Bay Area Governments, in cooperation with many public agencies throughout the Bay Area, prepared a draft Environmental Management Plan for the nine-county Bay Area in December 1977; and
- WHEREAS, three public hearings and numerous other public meetings were conducted on the draft plan throughout the Bay Area; and
- WHEREAS, more than 1,500 pages of written comments and amendments were suggested by local governments, other public agencies and the public; and
- WHEREAS, numerous changes in the plan were made by ABAG's Environmental Management Task Force, Regional Planning Committee and Executive Board to accommodate public concerns; and
- WHEREAS, because of these changes the Environmental Management Plan has achieved widespread public support from groups of divergent environmental, social and economic viewpoints, as well as local governments throughout the region; and
- WHEREAS, although the additional local expenditures resulting directly from the Environmental Management Plan are not large relative to previous or ongoing environmental management activities, local government fiscal resources are strained by the passage of Proposition 13; and
- WHEREAS, an Environmental Impact Report on the Environmental Management Plan has been completed in compliance with the California Environmental Quality Act and State EIR Guidelines;
- NOW THEREFORE BE IT RESOLVED that the General Assembly adopts the policies and actions of the Environmental Management Plan, including detailed description of County Surface Runoff Plans in Appendix C, for transmission to the Governor of the State of California for certification and submission to the Environmental Protection Agency; and
- BE IT FURTHER RESOLVED that the actions of the plan should be carried out by the responsible agencies designated in the tables of policies and actions according to the schedules contained in the tables, but subject to the timely availability of Federal, State and local funds; and

BE IT FURTHER RESOLVED that the cities and counties of this Association, because of the impact of Proposition 13, reserve the right to postpone implementing any provision in the EMP involving additional local expenditures; and

BE IT FURTHER RESOLVED that the text of Volume I of the Environmental Management Plan; Volume II (Environmental Impact Report and Index of Agency Responsibilities; Volume III (Summary of Public Comments and Responses); and Appendices A, B, D, E, F, and G (containing technical materials) be transmitted to the Governor of the State of California for certification and submission to the Environmental Protection Agency as explanatory materials; and

BE IT FURTHER RESOLVED that the letter of transmittal of the plan and its accompanying explanatory materials be approved; and

BE IT FURTHER RESOLVED that the State agencies be requested to take formal action on the plan prior to August 31, 1978, so that the General Assembly may review State agency actions on the plan at its October 1978 session.

The foregoing resolution was approved by the General Assembly this 10th day of June, 1978.

Attest:



Revan A.F. Tranter
Secretary-Treasurer

Signed:



Rod Diridon
President

ENVIRONMENTAL MANAGEMENT PLAN

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Chapter I

INTRODUCTION

This is the Environmental Management Plan for the San Francisco Bay Area. It describes what steps would be necessary to meet the standards of the Federal Water Pollution Control Act Amendments of 1972 and the Clean Air Act of 1970, as well as other State and Federal laws.

The Environmental Management Plan was prepared by the Association of Bay Area Governments, with the assistance of the Bay Area Air Pollution Control District, the Metropolitan Transportation Commission and the San Francisco Bay Regional Water Quality Control Board. Plan preparation was under the direction of a 46-member Environmental Management Task Force, a policy advisory body to the Regional Planning Committee and Executive Board of the Association of Bay Area Governments. The task force was charged with preparing a plan for solving water, air and solid waste problems. The plan presents a series of actions that shows how the region can solve the problems, and, in so doing, meet key Federal and State standards. The social and economic consequences of taking these actions are also noted, as are agencies responsible for carrying out the actions.

This plan is necessary for two reasons:

- o The Bay Area still faces environmental problems that need to be solved.
- o Federal law requires various regional plans, which are combined and made consistent in this plan.

Without an EPA-approved plan, future Federal sewerage and transportation funds for the Bay Area may not be granted.

There are three goals of the plan:

1. To lead to the greatest possible improvements in water and air quality and problems caused by solid waste.
2. To lead to compliance with Federal and State standards and objectives at the earliest possible date.
3. To be implementable--that is to have no social, economic or environmental effects so unacceptable that the plan cannot be carried out.

Water quality (areawide waste treatment management) plans are required by Congress in Section 208 of the Federal Water Pollution Control Act. Such plans will cover the entire nation. In about 170 metropolitan areas of the country, regional planning agencies like ABAG are preparing "208" plans. In California, for areas not designated for regional planning, the State Water Resources Control Board is responsible for preparing such a plan. For the purposes of meeting the requirements of Section 208, the San Francisco Bay Area includes the counties of Alameda, Contra Costa, San Francisco, San Mateo and Santa Clara Counties, with major parts of Marin, Solano, Sonoma and Napa Counties.

State plans to achieve and maintain Federal air quality standards are required by Congress through the Clean Air Act. In the Bay Area, an air quality plan is being prepared for the area included within the San Francisco Bay regional air basin. This includes most of the nine counties,

with the exception of northern Sonoma County and northeastern Solano County. The air quality plan will be included in the Federally required statewide implementation plan.

Planning for solid waste covers all nine counties, and the solid waste plan will be included in the State plan to meet the requirements of the Resource Conservation and Recovery Act of 1976. Planning boundaries are shown in Figure 1.

The Environmental Management Plan covers four major environmental issues: water quality, water supply, solid waste and air quality. The water quality chapter of the plan covers surface runoff, municipal and industrial discharges, and miscellaneous pollution sources. The water supply chapter also covers water conservation and reuse. The plan also examines how growth in the region affects environmental pollution. It describes how planning would continue after an initial plan is adopted. Updating this plan is required by Federal law.

If Federal standards are to be achieved according to Congressionally established time schedules, local governments cannot do the job alone. The plan therefore contains recommendations for coordinated actions by all levels of government. Only through such actions can environmental standards be achieved in the Bay Area. If the plan is to be carried out, the Federal government is expected to provide continued financial support for public transportation and sewerage facilities. State action would also be necessary, such as for further automobile emission reductions and continued regulation and enforcement of solid waste and water quality standards and requirements. Cities and counties would need legislative actions by the State and Federal governments. Legislative recommendations are contained in Chapter VIII.

In the past the Federal and State governments have often acted without an adequate understanding of the complexities and burdens of local governments. They sometimes asked too much of local governments, given the demands for local public services and the limited revenues available to local government. The ABAG environmental management program has provided, and will continue to provide, the opportunity for Bay Area cities and counties to develop and update this Environmental Management Plan.

This process provides for a plan that:

- o Defines the environmental problems.
- o Indicates what steps are necessary to solve them.
- o Recognizes that local governments must make good faith efforts to solve existing pollution problems and avoid future ones.
- o Recognizes that such efforts will cost all levels of government more money.
- o Establishes a procedure for public review and approval of the plan by Bay Area cities and counties.

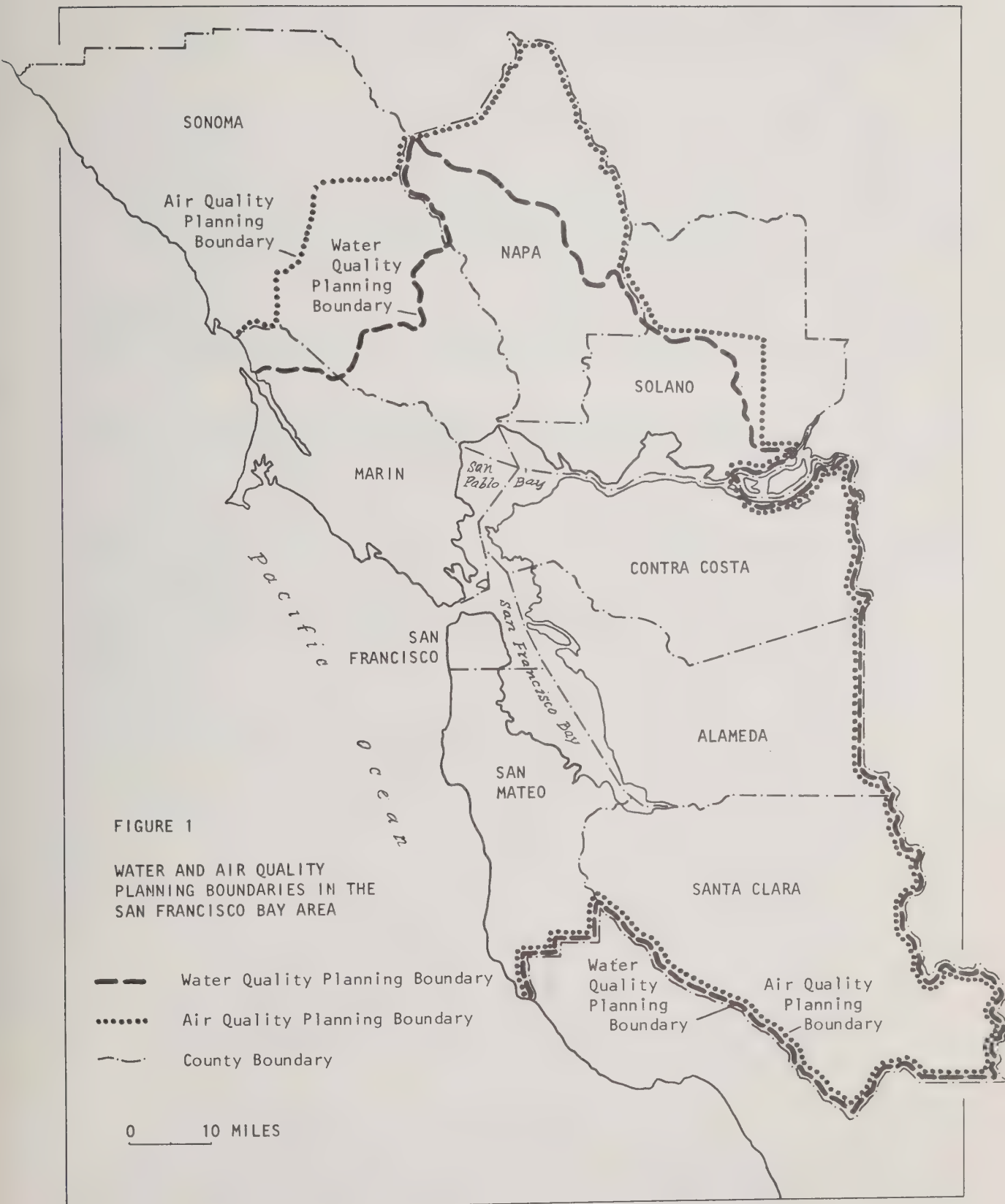


FIGURE 1

WATER AND AIR QUALITY
PLANNING BOUNDARIES IN THE
SAN FRANCISCO BAY AREA

— — — — — Water Quality Planning Boundary

..... Air Quality Planning Boundary

- - - - - County Boundary

- o Calls for State and Federal governments to do their part to carry out the initial plan.
- o Describes a process for updating the plan to reflect progress in cleaning up the environment, while addressing other public goals of the region such as providing decent, affordable housing and a healthy economy for the Bay Area.

The initial Environmental Management Plan was developed as follows:

1. A draft of the plan was released in December 1977 for public review and comment, following more than 18 months of technical work, public workshops and meetings, advisory committee meetings and recommendations, and direction provided by the Environmental Management Task Force (the policy advisory body for the initial planning program).
2. A draft EIR was completed and released for public review and comment in December 1977, in accordance with the California Environmental Quality Act.
3. More than 1,500 pages of written comments and recommended amendments were submitted by Federal, State, regional and local agencies and the public. A summary of these comments and staff responses are contained in Volume III of this plan.
4. Three formal public hearings on the draft plan and draft Environmental Impact Report were conducted. These hearings were conducted on February 1, 1978, in San Jose; on February 8, 1978, in Berkeley; and on February 16, 1978, in San Francisco. Public hearing comments and staff responses are included in Volume II of this plan.
5. Two public discussions on the draft plan were also conducted by the Environmental Management Task Force, in Berkeley on January 11, 1978, and in Napa on January 25, 1978; and an additional public discussion was conducted by the ABAG Executive Board on March 16, 1978, in San Rafael. Numerous other meetings on the plan were conducted by county boards of supervisors, city councils and public interest groups.
6. The EMTF completed its review and modifications to the draft plan, taking into account comments and responses, on March 16, 1978.
7. On April 5, 1978, the ABAG Regional Planning Committee reviewed the plan for its consistency with the existing ABAG Regional Plan and forwarded the EMTF-recommended plan and its recommendations to the ABAG Executive Board.
8. On April 20, 1978, the ABAG Executive Board reviewed the EMTF-recommended plan, the RPC findings and recommendations, and, taking into account additional public comments and recommendations of local governments, recommended an Environmental Management Plan for adoption by the ABAG General Assembly.

9. A supplement to the draft EIR was published in April, and comments and responses prepared by staff were forwarded to the General Assembly. Appropriate text changes to the draft EIR were made to reflect changes in the draft plan made by the EMTF, RPC and Executive Board.
10. On June 10, 1978, the ABAG General Assembly took preliminary actions on the draft plan, making minor changes to the plan (involving clarification and reorganization of some implementing actions), and certified (by Resolution 1-78 included in Volume II of this plan) the final EIR in accordance with the California Environmental Quality Act (and State EIR Guidelines), and adopted (by Resolution 2-78 included in this Volume) the initial Environmental Management Plan.

The chart on the following pages indicates the changes made by the various policy bodies, and covers the final actions on the initial plan by the General Assembly.

The General Assembly-recommended Environmental Management Plan is, pursuant to Federal and State law, submitted to the State of California for certification and submission to the U.S. Environmental Protection Agency.

The succeeding chapters of this volume describe current environmental problems and recommended solutions, as well as the benefits and costs of doing so. The policies and actions of the recommended plan are contained on blue pages, as is the project list of wastewater facilities. County surface runoff plans are contained in Appendix C of the plan volumes. Volume II includes the Environmental Impact Report and index of agency responsibilities, and shows how the plan satisfies State and Federal requirements. Volume III summarizes public comments on the draft plan and presents staff responses, organized by plan content and chronologically. The white pages of this volume and Appendices A, B, D, E, F and G of the plan volumes contain explanatory materials.

DRAFT PLAN AND CHANGES

	DRAFT PLAN RECOMMENDATIONS	CHANGES BY ENVIRONMENTAL MANAGEMENT TASK FORCE	CHANGES BY REGIONAL PLANNING COMMITTEE	CHANGES BY EXECUTIVE BOARD	CHANGES BY GENERAL ASSEMBLY
9-1 WATER QUALITY	Create San Francisco Bay-Delta Research Program.	Create council to consider need for program.	No major changes.	No major changes.	No major changes.
	Re-establish recreational and commercial harvesting of shellfish from the bay.	No major changes.			
	Carry out counties' surface runoff management plans.	No major changes.			
	Continue construction of municipal and industrial sewerage facilities.	No major changes.			
	Treat industrial wastes going to municipal sewers based on discharge requirements for municipal treatment plant.	No major changes.			
	Prohibit vessel waste discharge to parts of bay.	Conduct hearings on prohibitions.			
	Require vessel pump-out and on-shore toilet facilities at all marinas.	No major changes.			
	Require public management of new wastewater disposal systems for unsewered areas.	Replace public management with periodic inspection and establishment of procedures to ensure maintenance.			
	Monitor and report on oil and chemical spill prevention and clean-up.	Establish task force to investigate non-petroleum spills in the bay. ABAG consultant to report on inland chemical spills.			
WATER SUPPLY	Establish a Water Management Coordinating Committee	Make committee informal and voluntary. Request committee to consider interagency water transfers, water restrictions during drought, new water projects, a drought contingency plan, ground-water management, domestic water quality.	No major changes.	No major changes.	No major changes.
	Carry out region-wide, moderate water savings programs.	No major changes.			
	Construct cost-effective water reclamation projects.	No major changes.			

	DRAFT PLAN RECOMMENDATIONS	CHANGES BY ENVIRONMENTAL MANAGEMENT TASK FORCE	CHANGES BY REGIONAL PLANNING COMMITTEE	CHANGES BY EXECUTIVE BOARD	CHANGES BY GENERAL ASSEMBLY
SOLID WASTE	Carry out county solid waste plans.	No major changes.	No major changes.	No major changes.	No major changes.
		Add policy of 30% reduction in municipal wastes going to landfill by 1982.			
	Carry out various steps to reduce the amount of waste generated, increase recovery and recycling, improve the disposal of solid wastes, increase the possibilities of recovering large amounts of energy from solid waste, and improve the handling and disposal of hazardous wastes and sewage sludge.	No major changes.		Delete reference to mandated deposit bottle program.	
AIR QUALITY	Use "best available control technology" on new and existing hydrocarbon sources, including using paints with water base and/or high solids content and closed systems for handling organic liquids.	Use "available control technology" on existing sources giving reasonable time to pay for new equipment and giving consideration to other effects of requiring such controls in each case.	No major changes.	No major changes.	No major changes.
	Continue to review new and modified industrial and commercial sources (requiring low emissions or sometimes prohibiting such sources on a case-by-case basis).	Use "lowest achievable emission rate" for new or modified sources. Continue to review new and modified sources, using "offsets" and other provisions of law where possible in lieu of prohibitions. (An "offset" is a reduction in emissions from existing industry or commerce by an amount greater than the emissions from a new industry. The reduction is paid for by the new industry.)		Develop procedures other than offset to permit industrial growth and not penalize this region with respect to other regions.	
	Require 50% cleaner vehicles than called for in 1977 Clean Air Act Amendments	No major changes.			
	Carry out program of inspection and maintenance of all vehicles to insure that pollution controls are operating properly.	Make recommendation Statewide.		No major changes.	
	Require exhaust controls on all existing, large gasoline trucks.				
		Add condition that if State or Federal requirements for vehicle controls are delayed, this region should be given extensions beyond the Federal compliance dates.			

AIR QUALITY (CONT.)

DRAFT PLAN RECOMMENDATIONS	CHANGES BY ENVIRONMENTAL MANAGEMENT TASK FORCE	CHANGES BY REGIONAL PLANNING COMMITTEE	CHANGES BY EXECUTIVE BOARD	CHANGES BY GENERAL ASSEMBLY
Increase tolls on bridges.	Add condition that increases should only be made if needed to finance public transit service improvements.	No major changes.	Delete (recommended by Metropolitan Transportation Commission (MTC))	No changes.
Impose regional parking tax.	Delete.		No major changes.	
Provide preferential parking for carpools and vanpools.	No major changes.			
Provide additional transit service.	Replace with three-fold transit improvement strategy (recommended by MTC): <ul style="list-style-type: none"> o MTC to adopt service improvement objectives that can be financed by existing resources o MTC to continue efforts to identify need for additional services and pursue services if justified o 35% increase in ridership if there is increased Federal and State funding. 		Delete reference to 35%; call for additional transit subsidies from State and Federal governments (recommended by MTC)	
Increase bus and carpool lanes and ramp metering.	No major changes.		No major changes.	
Create an auto control zone in San Francisco central business district.	Move to continuing planning process and change to central business districts in general.		Delete from continuing planning process.	
Provide more ride sharing services such as jitneys and vanpools and develop more extensive bicycle systems.	No major changes.		No major changes.	
Alter regionwide development patterns to reduce urban sprawl and reduce automobile travel.	Move to continuing planning process. (See continuing planning process below.)		Remove specific reference to land use policies from continuing planning process tasks.	
	Identify for Executive Board decision three categories of controls to provide needed emission reductions after 1985: <ul style="list-style-type: none"> o Small gasoline engines o Off-road vehicles (for example, construction vehicles) o Transportation controls such as gas tax, road tolls, and additional transit. 		Carry out in 1990, or after, one or more of the following to maintain oxidant standards <ul style="list-style-type: none"> o Controls on small gasoline engines o Controls on off-highway vehicles o Additional transit o More stringent vehicle emission controls 	

	DRAFT PLAN RECOMMENDATIONS	CHANGES BY ENVIRONMENTAL MANAGEMENT TASK FORCE	CHANGES BY REGIONAL PLANNING COMMITTEE	CHANGES BY EXECUTIVE BOARD	CHANGES BY GENERAL ASSEMBLY
CONTINUING PLANNING PROCESS	Carry out continuing planning process for water quality, water supply, solid waste, and air quality and update the plan regularly. Process includes memorandums of agreement with Regional Water Quality Control Board, State Water Resources Control Board, Bay Area Air Pollution Control District, and Metropolitan Transportation Commission for joint planning.	Move continuing planning for water supply, solid waste, and air quality to an addendum to plan. (This put land use in the addendum.)	Put continuing planning for water supply, solid waste, and air quality back into continuing planning process. Keep land use in the addendum pending legal opinion on sanctions under Clean Air Act.	Remove addendum from plan. Make update annual if necessary. Remove reference in plan to land use policies being specifically examined.	Call for annual report on national implementation of environmental protection laws to ensure equitable application of Federal laws.
	Continue Environmental Management Task Force.	No major changes.	No major changes.	Create an appropriate body consisting of a majority of local elected officials plus citizens with varied backgrounds to conduct continuing planning process.	No major changes.
LEGISLATIVE RECOMMENDATIONS	Enact legislation to carry out previously mentioned recommendations.	Add recommendations to: Provide funds to State Department of Health to regulate shellfishing Provide funds for transit service increases.	No major changes.	Call for Congress to reexamine Clean Air Act requirements.	No major changes.
AFFIRMATIVE ACTION	Carry out a number of steps to improve affirmative action in carrying out the Environmental Management Plan.	No major changes.	No major changes.	Change language to remove inference that new affirmative action units would be set up in existing organization.	No major changes.

Chapter II

PUTTING THIS PLAN IN PERSPECTIVE

State and Federal agencies have given local governments the responsibility of developing a plan that meets national and state requirements for clean air and water, and for disposing of solid waste. A plan containing these basic elements cannot be prepared without an understanding of environmental problems and issues, nor can it be prepared apart from other social and economic concerns of the region.

The plan therefore does these things:

1. It identifies major environmental problems in water quality, water supply, solid waste handling, and air quality.
2. It recommends measures to solve these problems, and identifies measures necessary to achieve Federal and State standards for clean air and water.
3. It assesses recommended measures for their environmental impact and dollar cost, as well as for their probable social and economic effects on the region.
4. It recommends actions to carry out approved measures, measures to monitor the program, and procedures for continually adjusting the plan as new information or new techniques are available.

The plan shows that environmental problems are in several instances severe and should be addressed soon or the solution could become even more expensive and more difficult to achieve. The solutions to these severe environmental problems have far-reaching effects on the society and economy of the region. Balancing environmental goals with social and economic goals--such as mobility, jobs, and housing--involves many difficult public decisions. A great many people, for instance, depend on the mobility of a private car rather than public transit for getting to work, for recreation and running errands. At the same time cars pollute the air and endanger public health. They create congestion, add to neighborhood deterioration, and make walking to school more dangerous for children. The plan provides the region the opportunity to decide how much mobility can be exchanged for less congestion and cleaner air.

Many other conflicting goals will become apparent in this plan. Environmental decisions, as proposed in the plan, require careful evaluation in relation to other needs in the region. This process requires full public participation and informed action by local elected officials, especially those of cities and counties, because the collective authority of local governments covers not only the environment, but the social and economic well-being of the region. This chapter describes what impacts the region could expect if all actions recommended by the plan are taken. However, no plan can answer every question or anticipate every conflict. This plan therefore proposes a procedure that would continue the evaluation of problems and resolve the conflicts.

What's Our Current Situation?

The Bay Area is maturing as a urban region. In the 1940s our population increased by 55 percent--its largest increase in any 10-year period since 1900. From 1960 to 1970, Alameda, Contra Costa, Marin and Santa Clara Counties grew rapidly--faster than Los Angeles County--although San Francisco's population declined by 3.3 percent. By 1977, our population had increased to more than 4.9 million--5.5 percent higher than the population in 1970. In the 1950s and 1960s a substantial suburban area of single family homes was developed at the edge of the older, more dense core areas. These areas depended on the automobile for travel. Growth occurred because gasoline was cheap and there seemed, at the time, no considerable costs associated with that kind of development. Federal tax laws and mortgage insurance programs accelerated and aided this development.

The amount of urbanized land in the Bay Area increased dramatically. The urbanized portion of the region has grown from 42 square miles in 1852 to about 1,300 square miles today. As sprawl development became more popular over the past 30 years, population densities dropped. In the next few years, the Bay Area is expected to continue to grow and to convert additional open space to urban uses. Generally, suburban areas would grow more rapidly and the population of center cities would continue to decline, resulting in continued sprawl and longer commuting.

Population has continued to grow in large measure because the Bay Area continues to increase its employment opportunities. Early a major transportation, trade and financial center of the West, the Bay Area has more recently grown in aerospace and electronics industries due to the large number of highly skilled residents and significant government investments.

While there were economic problems during the 1960s and 1970s, the Bay Area continued to attract people convinced that jobs are available. At the same time unemployment is more intense here than in the rest of California and the nation. In 1977, our jobless rate was 7.6% compared to 7.4% for the State and 6.9% nationally. Jobless rates in Contra Costa, Marin, San Francisco and San Mateo Counties have nearly doubled since 1970. In the two counties that have gained most in population since 1970--Santa Clara and Sonoma--the jump in unemployment rates was about 50%, while the increases in Napa and Solano Counties was about 10%.

Local government has traditionally relied upon urban growth and economic development to increase revenues to provide governmental services. The costs of government have risen markedly in recent years, but revenues have not kept pace. This is especially true in older areas, as they can no longer rely on growth for new revenues. Many parts of the region are therefore increasingly concerned about the costs of public programs and the ability of local governments to provide adequate services based on relatively fewer resources.

Much progress has been made in cleaning up our environment. The waters of the Bay are much cleaner than they were years ago. Many Bay Area jurisdictions recently have begun work on major new wastewater treatment facilities, as have many industries. Until this drought, the worst on record, we have had an adequate supply of safe water; during this drought we are still managing to supply essential amounts of water with no compromise on safety. We still manage to collect and dispose of solid waste without major public health problems. And air quality in the Bay Area has been gradually improving in the last few years.

But serious problems remain. The Bay is not yet clean, we will need more water, and we are running out of convenient places to bury solid waste. Our most serious environmental problem, though, is air quality. The air is unhealthy too often in too many places, and the sources of pollutants are widespread, expensive and difficult to control. If present trends continue, the air will continue to get cleaner until 1985. But then it will begin to deteriorate.

Water pollution control actions in recent years have produced substantial improvements. Yet some problems remain and some of these problems are serious.

- Shellfish and the waters overlying shellfish beds are contaminated. All shellfish and all waters are not contaminated, and those that are contaminated are not always so. However, there is an abundant shellfish resource in the Bay, and the use of that resource is restricted because of the threat to public health. The sources of contamination are surface runoff, vessel wastes, spills, and municipal-industrial sewage discharges (even though these discharges are much cleaner than a few years ago).

- Several subtle adverse effects have been noted. These include a higher incidence of premature births in harbor seals, thin shells in eggs of aquatic birds, cancer-like growths on mussels, and the drastic reductions in the population of the Dungeness Crab. Pollution may not be the cause but it is certainly suspect.

- The flow of fresh water from the delta into the Bay will be reduced in the future. A drain to carry agricultural wastes (high in salt and nutrients for algae, less pesticides than Bay waters) from the central valley to the north bay is being considered. Both could cause problems.

Surface runoff from agriculture and urban land contributes to water pollution. At the same time we are only beginning to learn about the cause and effect relationship between this runoff water and the remaining pollutants.

If the region can eventually clean up its waters we will benefit from a renewed marine economy, improved recreational facilities, and the reuse of reclaimed water. The costs of cleaning up the water are largely dollars needed for new treatment facilities and research. A majority of these costs are expected to be borne by State and Federal funding.

The drought of the last two years has shown that people need less water than was thought. It has also shown that the facilities may not be able to deliver as much water as was thought. These two factors suggest that the regional may be able to reduce its needs for currently planned water projects. Obviously in years of more rainfall there is no reason to continue strict conservation measures, but continued conservation at a moderate level is the most economical first step in matching supply and need. The question in water supply is what action should be taken to assure adequate supplies for the region as it grows? The costs of improving out water supplies are largely the dollars needed to construct need dams and transport systems. Reducing the number of such projects will obviously save money. The benefits of an adequate supply are our ability to make it through future droughts without undue harm to our health and economy, and to have a plentiful supply at relatively low cost in years of average or better rainfall.

Solid waste presents a somewhat different problem. Countywide solid waste plans, prepared and adopted under a State law enacted in 1972, go a long way toward controlling the contamination caused by the existing system of landfilling wastes. But, as present landfill sites fill up and close, we have to go further away to find appropriate new sites to properly dispose of wastes. This adds to costs. Also, we dispose of metals, glass, paper and other materials that can be recycled. Recycling requires fewer land resources for burying wastes and less dependence upon increasingly scarce virgin natural resources. The major portion of the Bay Area's wastes that cannot be recycled is made up of organic matter--garbage, yard wastes and reuse. Facilities to convert these to various forms of energy may be operative by the early 1980s, once current site-studies establish economic, technological and environmental feasibility. In addition, processing waste materials for reuse requires less energy than processing raw materials the first time.

Projected growth for the Bay Area means that, if methods aren't altered, we will generate 15.5 million tons of solid waste in 1990 or 4 million more tons than in 1975. Costs of reducing wastes and increasing recycling are difficult to estimate. Products made of virgin natural resources are now cheaper than those made from recycled materials. Improved solid waste management means more land available for recreational and development purposes. Better management conserves energy and material resources.

A great many factors contribute to air pollution: industry, cars, small firms such as dry cleaners, and surfacing materials such as paint and asphalt. Those most susceptible to bad air are the young, the elderly and those with special medical problems. Federal and State air standards were set to achieve an environment not harmful to susceptible groups and to lessen the possibility of health hazards to other people. The details on these standards are spelled out in Chapter VI. Action by all levels of government to control virtually all sources of air pollution is required if the Bay Area is to meet air quality standards. Reducing the health hazards posed by air pollution will affect the daily lives of most citizens and cost a great deal of money. We know that it will require substantial investments by private industry in pollution control devices

and by citizens in pollution controls for cars. It will require that we reduce the number of vehicle miles traveled in the region. The result would be clear benefits in better health. Moreover, cleaner air could mean improved agricultural yields and greater recreational opportunities.

What Can We Do About It?

Since a large number of variables creates environmental problems, it is not surprising that a large number of measures is included to change the interaction. Just as the problems are related (cleaning up the water creates solid waste) so are the solutions. This plan is not simply a list of independent actions. Although some of the actions stand alone, others have been tailored to complement one another. Their overall effect, both benefits and costs, is greater than the sum of the individual effects.

One important point in keeping this plan in perspective is how its recommendations are affected by population growth. In 1975, the region's population was approximately 4.8 million people. For the purposes of the Environmental Management Plan and other planning activities in the region, ABAG and other participating agencies (notably the Metropolitan Transportation Commission) produced the latest in a series of projections on population, land use and employment in the region.

These projections show a Bay Area population of 5.4 million to 6.1 million for the year 2000. Households are expected to be between 2.5 million and 2.6 million, and employment from 2.6 million and 2.9 million. The labor force (and employment) is estimated to grow at a faster rate than total population. The projected average annual growth rate for the labor force through 2000 is 0.9 to 1.3 percent, compared to a population growth rate of 0.5 to 1.0 percent. Households--or occupied housing units--are estimated to grow at a faster annual rate than either population or labor force--1.4 to 1.6 percent.

The projections were developed as follows:

- o Future regional totals were projected, based primarily on fertility rates, rate of migration into the region and trends in economic development. The region's rate of economic development was based on projections of the nation's economy and the region's share of that development. Regional projections were expressed in a range to account for uncertainty about fertility, migration and economic development (Examples of factors contributing to the uncertainty: Congress might change laws affecting legal and illegal foreign immigration; government laws and practices on birth control and abortions might affect fertility rates; the interaction of international and national economies--particularly regarding energy--has rippling effects down to the regional level).

- o Local agencies were surveyed by county agencies assisted by ABAG. The survey collected the current land development and service provision policies of the local agencies.
- o Total population and employment were distributed in the region among 440 zones. Each zone is a combination of census tracts. The distribution was consistent with local development policies for the first decade of growth. After 1985, densities had to be increased to accommodate projected growth.
- o The zones were added together to give totals for cities, counties, drainage areas and other units. (These were the provisional Series 3 projections).
- o The provisional projections were reviewed by local agencies and adjusted to reflect this review.
- o During the process of integrating the plans, alternative projections were made, consistent with the air quality recommendations for compact development in the draft plan.
- o When compact development was not recommended for air quality purposes, the projections were revised accordingly, and the plan was and is consistent with the Series 3 projections approved for use by ABAG's Regional Planning Committee. The projections used are described in Appendix A.

Two facts govern the use of projections for the Environmental Management Plan:

1. The region's population cannot be determined precisely. Birth, migration and economic development rates cannot be projected with certainty. The uncertainty is accounted for in the range--the difference between the high and the low projections. In 1975 the region's population was 4.8 million. The high projection for the region in the year 2000 is 6.1 million. The low projection is 5.4 million. The difference is 700,000, slightly more than the present population of San Francisco.
2. The plan does not recommend a population total for the region. Nor does the plan include recommendations that significantly affect the total. The range of 5.4 to 6.1 million provides a working assumption on the numbers of people we can expect in the region by the year 2000.

These two facts mean that it is not appropriate to assume a single-projection, although it is often done to give the impression that planning is easier and more precise than it can be. A plan must be prepared that accommodates uncertainty:

- o Plan recommendations should accommodate the uncertainty represented by high and low projections.

- o The continuing planning process must be capable of adjusting the plan as growth trends change.

The specific recommendations of the plan are spelled out in chapters III through VIII. These actions were developed on the basis of technical findings and the advice and direction of the Environmental Management Task Force, technical advisory committees and public comments. Preliminary recommendations were circulated since September 1977, and changes were made for the draft plan of December 1977. As a result of additional hearings and actions of the EMTF, the RPC, the Executive Board and the General Assembly, other changes were made in the plan.

Listed below are the highlights of the plan adopted by the General Assembly:

Water Quality

- o Completion of the construction sewerage facilities program to clean up municipal and industrial discharges
- o Programs in each county to reduce pollution by surface runoff
- o A program for the re-establishment of recreational and commercial harvesting of shellfish in the bay
- o Establishment of the San Francisco Bay-Delta Research Advisory Council to coordinate ongoing studies and initiate studies into poorly understood problems.

Water Supply

- o Formation of a Water Management Coordinating Committee, a voluntary association of major water agencies to address regional supply-demand issues
- o A program for a moderate level of regionwide water conservation
- o Reclamation and reuse projects

Solid Waste

- o Carrying out the initial phases of the county solid waste plans, that call primarily for continued landfilling
- o Initiation of programs to reduce the amount of solid waste generated (e.g., by reducing excess packaging) and to increase recovery and recycling of solid waste.
- o Programs to control the disposal of hazardous solid waste better
- o A program to handle the increasing amounts of sewage sludge.

Air Quality

- o Controls on stationary sources (industries, commercial establishments), specifically the use of "available control technology" on all of these sources
- o Controls on pollutant emissions from vehicles, including a 50% cleaner car than current regulations would require for 1977 cars and a Statewide program of inspection and maintenance of all vehicles to see that pollution control equipment is functioning properly
- o A program of transportation controls (e.g., more mass transit, preferential parking for carpools) that would reduce the number of miles traveled by automobile
- o Review of all proposed new industries to see that they would not significantly impair the region's clean-up of the air. Those that would cause impairment would not be allowed as proposed.

Continuing Planning and New Legislation

- o No major changes in the powers and authorities of existing agencies and no new agencies
- o A number of agreements among agencies to coordinate planning
- o An annual update of this plan, guided by the Environmental Management Plan policy body and approved by local governments acting together, then by State and Federal regulatory agencies
- o State and Federal legislation to provide financial support for local governments environmental management responsibilities
- o Provide incentives to reduce waste generation, to create favorable market conditions for recycled products and to promote private sector actions for compact development
- o Support research and development programs for resource recovery technologies (e.g., removal of heavy metals from sludge).

Earlier in this chapter, two conditions were established so that the plan could accommodate the uncertainty about population.

The plan would accommodate the high and low projections of population. The continuing planning process calls for an annual update of the plan. The annual update would include a revision of projections. The recommendations for solid waste would not change if the high or low projection occurs. At this time the same is true for water supply. But the plan's action to establish a Water Management Coordinating Committee would provide a way to adjust water supply in keeping with population trends.

The water quality plan project list for municipal/sewerage facilities is affected, as shown on the list. Some projects would have their timing affected by population growth trends, and some projects would not be needed if population trends approach the lower figure. Decisions on these projects should be made on a case-by-case basis in the continuing planning process. The decision on whether and how such projects should be built should be based on population growth and availability of funds, life of the project, etc. In determining maximum grant eligibility, the State Water Resources Control Board is asked to use the higher projection as the guiding policy, while allowing project applicants to request capacities based on lower population trends or as a result of local desires.

The set of policies and actions in the air quality plan would achieve and maintain the oxidant standard. For either projection, meeting the standards would require application of the rules on new and previously existing direct sources of air pollutant emissions. Depending on the success of all other air pollution controls recommended in this plan, these reviews would require:

- o The prohibition of some new industries with significant emissions
- o Increased cleanup from existing sources through offsets/negotiation or in some cases prohibition of modifications proposed by existing sources

The higher the rate of growth, the more stringently control measures generally would have to be applied for the region to meet the oxidant standard. A greater fraction of permits would be denied, offset requirements would be increased, or an amended strategy would be needed over time in the continuing planning process.

What Does This Mean for City and County Governments?

For many local jurisdictions, especially those acting as water and/or wastewater agencies, environmental management responsibilities are not new. The plan proposes a more active role for local governments in planning and evaluating new programs and facilities. Each year, local governments acting together would approve the update of this plan. The annually updated plan would cover, at a minimum, water quality, water supply, solid waste and air quality. Through review, modification, and approval of the plan, local governments would be taking on responsibilities now almost exclusively exercised by State and Federal governments.

Additional costs would be required of local government to meet the need for new facilities recommended in this plan. Improving wastewater treatment facilities would increase both capital and maintenance costs. Public education programs to alert citizens to recycling efforts, and water conservation programs would all cost money. These increased costs would be reflected in higher costs of doing government business.

The costs of wastewater treatment facilities will depend upon both the overall population of the region and its development patterns. ABAG projects the population of the region to be between 5.4 million and 6.1 million people by the year 2000. If the regional population reaches 6.1 million, treatment projects noted in the 20-year list will be required.

There are also several less certain costs and benefits that could accrue to local governments as a result of this plan. These need to be carefully monitored as the plan is implemented. If the costs become too burdensome, adjustments to trim back pollution control efforts would be required. If greater benefits are created than expected, additional efforts can be made to achieve environmental standards more rapidly.

What Does This Mean To Private Industry?

The recommendations call for private industry to concentrate on developing new and sophisticated technologies that can more efficiently reduce pollution emissions for both air and water. New technologies would be required to reduce emissions for new and existing facilities if air quality standards are to be achieved. This will cost money, and a portion of these costs would be passed on to consumers. According to a McGraw-Hill survey, businesses in the Bay Area will invest \$635 million in new plants and equipment in 1977. It is expected that \$44 million or 7 percent of this investment will be in pollution abatement equipment. Historically, pollution abatement expenditures by business and industry have represented 2 percent of total capital investment. However, pollution abatement costs began to increase in 1972, peaking at more than 10 percent of business investment in 1975. Since 1975, the ratio of pollution control costs to total capital investment has been declining. Studies by Chase Econometrics as well as McGraw-Hill suggest that the ratio will continue to decline until a new equilibrium or long-term average is achieved. Based on these studies it is estimated that in the future pollution control expenditures will represent about 4 percent of total business investment.

These investments in pollution control would use money that would otherwise be invested in other sectors of the economy. For example, housing investment could be affected. However, in California the savings and loan network is strong, and this should continue to provide substantial funds for housing. Reductions in other investments as a result of new pollution controls can be expected to be spread over the economy with minimal effects on any given sector.

Cleaner waters will benefit the region. If a commercial oyster fishery were established it is estimated to be worth \$20 to \$25 million per year. Present industrial processes, generally, make it cheaper to pollute than to prevent or clean up pollution. The added costs of pollution control would therefore be expected to increase at least certain consumer prices. At the same time some new technologies developed for pollution control have created greater overall efficiencies. In the long run this may mean decreases in production costs. Clearly those industries that perfect technologies reducing pollution and increasing efficiencies would obtain a considerable market advantage over other industries that do not.

Would Bay Area industries experience a competitive disadvantage relative to industries in other areas as a result of this plan? For example, if air quality is worse on the west coast than elsewhere will Bay Area industries be required to adopt more stringent controls in cleaning up our air? The primary sector of our economy that could

be so affected is manufacturing, since more than 50 percent of money spent for pollution control occurs in this sector. The overall economy of the Bay Area is strong relative to most other regions, and considerable new growth is expected in the electronics and aerospace industries, finance and insurance and government which would not be much affected by the recommendations of the plan. However, the effect on manufacturing remains a problem and must be considered in making decisions about the plan. Industry would be encouraged to work with its employees to provide opportunities for increased carpooling and bicycle commuting. At the same time local governments would need to be more sensitive to the locational criteria of private industry in making adequate land available for plant expansions and new facilities.

One area that would require constant attention in the Continuing Planning Process is the application of air quality regulations. Because of present conditions, it appears that any industry that produces substantial hydrocarbons or particulate emissions would not be permitted to locate or expand in the Bay Area. This would directly affect petrochemical, auto assembly, and basic raw material conversion industries in the immediate future. A program to develop an industrial location policy while making progress in achieving standards is required by the Clean Air Act Amendments of 1977 and is included in the plan. It is clear that the Bay Area economy requires some means for permitting new industrial development as a part of its overall planning.

What Does This Mean For State and Regional Agencies?

The existing responsibilities of State and regional agencies are recognized. The plan enables local governments to make a clear statement to State and Regional agencies about what they consider to be workable approaches to environmental problems. The work to date in preparing this document has relied heavily on coordination among agencies responsible for environmental quality. Staff from the Bay Area Air Pollution Control District, the Metropolitan Transportation Commission, and the Regional Water Quality Control Board participated directly in preparing the plan. The California Air Resources Board and the California Department of Transportation provided staff assistance. In some instances elected officials who serve on the policy bodies of regional agencies have actively participated in the Environmental Management Task Force. The plan illustrates that regionwide environmental planning can be done in this manner. Each agency has developed technically competent staff in specific areas; each agency has considerable experience in planning, regulation and implementation of specific environmental quality efforts; and each agency has statutory authority for specific plans and responsibilities to maintain them. For these reasons this plan makes no recommendations to consolidate agencies or functions; although some legislation is needed, no major actions are recommended.

What had been lacking prior to the Environmental Management Plan was a means of coordinating relevant agency actions in systematic fashion. The plan has provided that focus and proposes to continue the current

arrangement for up to two years. The problems of the environment are substantial. To meet the challenge, formal agreements are required for the immediate future. In general, the plan calls for a series of such arrangements among the relevant agencies. The specific recommendations are described in the individual management plan chapters and in the chapter on the continuing planning process.

The plan spells out specific actions to be taken by individual agencies. ABAG would continue as a coordinating agency responsible for preparing annual updates of the plan and assessing progress and effects of the plan over time. New regional coordination is recommended in the areas of water quality research and water supply planning because no existing agency has all-inclusive responsibility in those areas at present. In addition, regional agencies would cooperate in the coordination of permits for energy recovery facilities.

Local governments and regional agencies must work closely to assure that the needs of both existing and new populations can be served in a timely manner. This coordination may mean a reduction in costs for all public agencies involved.

What Does This Mean For Citizens of the Bay Area?

Air pollution can have deleterious effects--sometimes very serious effects--on health.

- Photochemical oxidants cause irritation of mucous membrane in eyes and nasal passages, increased fluid in the lungs, coughing, rapid pulse rate, lowered blood pressure, asthma attacks, and overall decrease in performance.
- Photochemical oxidants also cause respiratory distress in healthy people, especially children, including sore throats, headaches and difficult breathing.
- Short-term oxidant exposure has been associated with aggravation of existing disease.

Air pollution also affects plant life. Biological effects occur not only in individual plants but also in plant communities and entire ecosystems. The implications of oxidant exposure to agricultural crops are rather dramatic.

- Certain crops are no longer grown in the Bay Area because of air pollution. Among these crops are head lettuce, romaine lettuce, endive, snap dragons and chrysanthemums.
- Estimated loss to cut flower growers in the Bay Area in 1970 was approximately \$1 million.
- Available data would suggest annual agricultural damage in the Bay Area from oxidant air pollution reaches several million dollars a year.

Just as with humans and plant life, air pollution can have negative effects on man-made materials. The cost of such damage takes two forms. There is the cost to the producer who must take preventative measures to protect products from ozone damage. There is also the cost to consumers. The consumer pays for such damage with higher product costs and through early replacement of materials such as carpets, drapes and clothing.

By improving air quality these effects can be minimized. In addition, there are other expected benefits. Improving air quality should result in fewer illnesses for workers, thereby increasing productivity and lowering medical costs. By improving crop yields, agricultural lands should become more profitable, and crops now grown outside the region may again be grown in the Bay Area. Improved yields would increase the value of agricultural land. This may decrease pressure on the land for other purposes.

The benefits of improved water quality would be substantial:

- 400,000 clamming days a year from reestablished shellfishing harvesting in San Francisco Bay. (This means that almost half a million people could spend a day clamming each year.)
- Cleaner streets brought about by expanded programs to reduce pollution from surface runoff.
- Greater recreational opportunities in freshwater lakes where siltation is reduced through erosion controls.
- Reduced health risks associated with shellfish harvesting.

Benefits from solid waste programs would be:

- Control of health hazards and nuisances from landfill sites.
- Reduced drain on natural resources through resource recovery programs.
- Assurances most hazardous wastes will be safely disposed or recycled.

Citizens of the Bay Area benefit most from a clean environment, but to achieve that advantage means substantial costs. The region's economy is complex and it is not possible to measure how the economy will react in all circumstances. Consequently, not all costs can be expressed in dollar values.

At least a portion of the costs of cleaning up industrial pollution would be passed on to consumers. A broad range of items such as paints, dry cleaning and plastics could increase in price, perhaps by as much as 3 percent, as a result of pollution controls. Tax

dollars would pay for public water pollution control facilities, but since the program is already established, taxes are not likely to increase. Property taxes may increase in locations where funds have not been committed to match State and Federal money for this program, although Proposition 13 will affect this considerably.

Recommendations for improving solid wastes could increase the time households spend handling trash because of the need to separate items. Recommendations for increased use of recycled materials would increase consumer prices marginally because with present technology recycled materials cost more. New technology could be expected to reduce those costs, but these savings would vary depending upon the type of material, processing techniques, and how soon technological improvements are available. On the other hand, if manufacturers make improvements in packaging that reduce the amount of materials used, production costs can be lowered. However, the difference would not be expected to result in markedly lower consumer prices.

The plan is expected to have economically negative effects on minorities and low-income residents, although people are expected to benefit significantly from a cleaner environment.

Any costs borne by local governments in implementing the plan will fall more heavily on persons of low and moderate income due to the regressive nature of property and sales taxes. The plan would also increase certain consumer prices, as noted previously, and even though these increases may be minimal, they would fall more heavily upon people with limited incomes.

The plan is expected to create jobs, particularly in construction, the installation of pollution control equipment, and resource separation and recycling. While others in the region may benefit from these jobs, it is clear that affirmative action and skill training programs are essential for minorities if they are to share in the economic benefits of environmental management.

Studies indicate that the worst health effects of a polluted environment fall on low income groups in central cities. Consequently, respiratory ailments and a higher incidence of lead in the blood of children occur with greater frequency among minorities and the poor who tend to live in central cities. Similarly, water pollution more seriously restricts the recreational opportunities of those with limited income who can less easily get outside the urban area. The plan would reduce these health hazards and improve the recreational opportunities for low-income and minority residents.

The plan can bring about energy savings. The inspection and maintenance program recommended could save as much as 10,000,000 gallons of gasoline or 24,000 barrels of oil per year. New engine technologies could eventually produce as much as a 50 percent improvement in vehicle mileage, which in turn could mean annual energy savings of millions of barrels of oil and several millions of dollars.

Clearly, as energy prices increase, savings increase. In some instances, transportation measures might decrease the reliance by some families on two automobiles.

The plan will have effects on employment, but these effects are not nearly as great as the effect of all other factors that influence employment. The region now has approximately 2 million jobs. By the end of this century it is projected that without this plan there will be between 2.6 million and 2.9 million jobs, corresponding to populations of either 5.4 or 6.1 million people, respectively. This amounts to between 500,000 and 800,000 more jobs. Put another way, between 11 and 13 million more person-years of employment are projected to occur whether or not the plan is implemented. (A person year means one person working fulltime for one year.)

Some of the actions recommended would create jobs. Other actions would result in fewer jobs being created. On the positive side the plan adds up to this: 120,000 person-years of additional employment would be for temporary employment, primarily in construction. The other 62,000 person-years would be permanent employment, that is, 5,000 new permanent jobs. Most of the permanent new jobs would be for maintenance and operation of pollution control equipment and facilities.

The employment created by the plan can be compared with what is estimated to occur without this plan. The person-years of employment created as a result of the plan is about one percent of the person-years of employment that would occur without the plan. The increase in permanent jobs would be about one-half percent of the number expected by the year 2000 without the plan.

On the negative side, the plan includes recommendations that would result in fewer jobs being created than would be the case without this plan. The recommendation with the greatest direct effect is the air quality recommendation for "new source review". This recommendation continues review of industrial expansion and, in some cases, results in prohibiting certain industries with significant emission of some pollutants. Most new industries would not be affected. The following industries probably would be: petrochemicals, primary metals, and transportation equipment (e.g., automobile or truck production).

For this analysis, it has been assumed that industries not allowed in this region would be permitted elsewhere. If this were so, approximately 43,000 jobs would not be created. This equals 500,000 person-years of employment. This estimate is probably high because, in fact, such industries denied permits to operate in the Bay Area would not necessarily be allowed elsewhere. Therefore, there could be greater pressure to work out ways of allowing such industries in this region. One possibility is "emission off-sets." This is discussed in the air quality plan. It amounts to reducing emissions from other industrial or commercial sources more than would be otherwise required. These reductions would more than "off-set" the emissions from the new source. The new source could then be allowed without the region incurring a net increase in emissions. Whether the off-set policy results in fewer jobs being created or an actual loss in jobs depends on two things: how many jobs would be created as a result of the new industry allowed to locate in the region, and how many jobs would be lost (if any) by the application of off-set to an existing industry.

The off-set policy might be viewed as tending to result in reduced employment or reduced job creation. Outright prohibition of a source, however, and the total loss of jobs created by that industry, would be more serious. Because off-set is a possibility, the estimate that approximately 43,000 fewer jobs would be created as a result of the continued application of the new source review rule is probably high.

Other recommendations may have indirect effects that amount to fewer jobs being created or to an actual loss of existing jobs. Most notable are the recommendations for more air and water pollution controls on industry. However, these recommended controls are essentially the same as those that would be required nationwide. So it is by no means clear that these recommendations will result in a net change in Bay Area employment. Furthermore, national studies indicate that the overall effect of pollution control has been to increase employment. Therefore, in keeping this plan in perspective, it is estimated that without this plan the Bay Area would experience about a 31 percent growth in jobs between now and the year 2000. With the plan the growth could be expected to be about 30 percent.

Direct Cost of Carrying Out the Recommendations

The direct costs of the recommended measures are shown in the table on the following page. The plan incorporates recommendations included in other planning programs--for example, carrying out the countywide solid waste management plans for the nine counties. Many of those recommended actions would very likely be carried out regardless of the actions taken on this plan. What is shown in the table is an estimate of the overall costs of environmental improvement activities--for actions incorporated in the plan and for actions directly attributable to the plan.

There are several important factors to be considered in interpreting the numbers shown in the table:

- The costs include capital, operation, maintenance and administrative requirements. They are in 1977 dollars. The figures in the table are the amounts that, if on hand at present, would meet all capital, operation and maintenance, and administrative expenditures through the year 2000 without escalation and assuming that the money could be invested at 6 3/8 percent. The figures are roughly equal to the total cost per year to pay off loans for capital, to operate and maintain facilities and to administer programs.
- Not all costs are local costs. Some will be paid for by State and Federal funds. For example, of the total capital cost for sewerage facilities to serve 6.1 million people--\$2.4 billion--State and Federal grants can pay 87½ percent of these costs for treatment plants.

COST OF THE PLAN

RECOMMENDATION	ANNUAL COST
WATER QUALITY	
CONTINUE SEWERAGE FACILITIES CONSTRUCTION	
MUNICIPAL	\$180 - 240,000,000
INDUSTRIAL	25 - 50,000,000
COUNTIES' SURFACE RUNOFF PLANS	250,000**
OTHER	1,400,000*
WATER SUPPLY	
REGION-WIDE WATER SAVINGS PROGRAMS	5,200,000*
COST-EFFECTIVE WATER RECLAMATION PROJECTS	10,200,000
SOLID WASTE	
COUNTY SOLID WASTE PLANS	215,000,000
OTHER	3,810,000**
AIR QUALITY	
INDUSTRY CONTROLS	18,000,000
VEHICLE CONTROLS	43,500,000*
TRANSPORTATION MEASURES	40,000,000
	<hr/>
	\$542 - 627,000,000 (rounded)

* "NEW" COSTS

** "NEW" COSTS TO BE PARTIALLY PAID BY CITIES AND COUNTIES

- The figures in the table represent an estimate of the overall direct cost of carrying out the recommended actions. The totals shown in this table eliminate duplication of costs that are shown in the plan tables for Chapters III through VI.

As readers review the costs in the plan tables in Chapters III through VI, it is important to note in this chapter that the costs shown in the individual tables of those chapters should not be added. Here is an example that shows why:

Costs of wastewater treatment projects in the water quality plan cover the same costs shown in the solid waste plan for facilities to handle the volume of sludge produced at the treatment plants. Any attempt to add the costs of the individual plan tables would overstate the cost of carrying out the plan by approximately \$46 million/year.

With these factors in mind, the overall cost of implementing the Environmental Management Plan is estimated to range from approximately \$542 million/year to about \$627 million/year.

Chapter III
WATER QUALITY
MANAGEMENT

Section-A

SUMMARY DESCRIPTION OF PLAN RECOMMENDATIONS

The Water Quality Management Plan is composed of five elements. The first of the elements contains those actions necessary to protect water quality but which do not relate to control of a particular pollutant source. The remaining elements correspond to sources of pollutants that must be controlled. The five elements are:

- Water Quality Management
- Municipal Facilities
- Surface Runoff
- Industrial Discharges
- Miscellaneous Sources

The overall strategy that the plan embodies ensures that effort and funds are expended on those controls that result in the greatest environmental benefit at the least social and monetary cost. Conversely, the strategy avoids the investment of effort and funds in control measures that have insufficient clearly demonstrable environmental benefits.

Because the existing water pollution control programs, aimed principally at municipal and industrial dischargers, have been quite successful, they form the foundation of the water quality management strategy.

With this sound footing the strategy focuses control efforts on the remaining pollution problems and on pollutant sources that have yet to be dealt with.

The problems that the plan addresses are described as an introduction to the plan itself.

PROBLEMS

Water quality in the region declined from the time the area was settled until around 1950. Water pollution control actions taken since that time have resulted in substantial improvements. However, some of the waters remain polluted; that is they remain unsuitable for swimming, fishing or other uses that we might reasonably expect.

Serious water quality problems remaining in the region are:

- Intermittent and localized obvious pollution as a result of inadequately treated or dispersed municipal and industrial wastewater discharges.
- Subtle and poorly understood adverse effects on aquatic life probably caused by toxic materials from a variety of sources.
- Bacterial contamination of shellfish.
- Siltation, aesthetic degradation and other pollution caused by surface runoff.
- The probably adverse effects of further reductions in freshwater inflow to San Francisco Bay as a result of proposed upstream diversions.
- The unknown but potentially adverse effects of agricultural wastewaters discharged from the proposed San Joaquin Valley agricultural drain.
- The potentially harmful effects of a major oil or chemical spill.
- Other problems resulting from vessel discharges, failing septic tanks and dredging activities.

SOLUTIONS

Solutions to each of the remaining water quality problems are described below in general terms.

Obvious Pollution

This problem can be solved by constructing wastewater treatment and disposal systems. When presently planned municipal and industrial facilities are completed in the early 1980's gross pollution will be eliminated. These facilities together with those needed to provide for population and production increases until the end of this century are described in the municipal facilities and industrial dischargers elements of the plan.

Pollution Caused By Toxic Materials

There is growing evidence that suggests that some toxic materials are harming aquatic life. Removal of toxic substances from waste discharges and surface runoff is often difficult and expensive. In view of this and the lack of conclusive evidence of harm, the recommended strategy is to reduce the discharge of toxic substances where this can be done easily and relatively inexpensively. At the same time research would be undertaken to determine whether harmful effects are, indeed, occurring and if further removals are justified.

Contamination of Shellfish

Eighty years ago the Bay supported a flourishing shellfishing industry. Although many large beds of shellfish still exist today they are largely an untapped resource. Contamination with bacteria and viruses, some of which may cause disease in man, is the reason for the current prohibition of recreational and commercial shellfish harvesting in San Francisco Bay. Other contaminants of concern are synthetic organic compounds and heavy metals. This plan recommends a two part strategy for realizing the potential of shellfish in the Bay. The first part of the strategy is to increase controls on the sources of contaminants. The second part is a program of surveying, monitoring and testing to ensure that any shellfish beds opened to harvesting are indeed safe.

The principal sources of bacteria are municipal sewage discharges, surface runoff, combined sewer overflows and vessel discharges. When the present program of wastewater treatment plant construction is completed municipal discharges will become an insignificant source of bacteria. Combined sewage overflows, that is overflows from combined sewage and stormwater collection systems during storms, are the subject of ongoing control programs in San Francisco and Oakland, the only communities in the region which have them. The control strategy recommended in the plan includes initiating a surface runoff control program and increasing regulation of vessel discharges.

Pollution caused by surface runoff

As rain falls on the land and flows to streams, lakes and the Bay, it picks up material from the surfaces it flows across. The materials incorporated into surface runoff depend on the type of surface and the use of the land. In cities, large areas are covered by asphalt and concrete, preventing percolation of the rain into the soil. Litter, animal wastes, soil particles, oil and grease, plant material and various chemicals are flushed from the urban area by the water flowing over the surface. In open areas the rain and flowing water erode exposed soil and carry this along with plant matter and animal wastes into neighboring water bodies. Polluted surface runoff often has an adverse effect on the receiving waters causing oxygen depletion, siltation, bacterial contamination and aesthetic degradation. Adverse effects can be minimized by reducing the accumulation of pollutants prior to runoff, by reducing the peak flow or volume of runoff, by controlling land-use in sensitive areas and by treating and storing runoff.

Reductions in Freshwater Inflow to the Bay

The major freshwater inflow to the Bay comes from the Sacramento-San Joaquin Delta. Upstream diversions have substantially reduced annual flow volumes reaching the Bay, and additional diversions are proposed. The flow reductions are of concern on two counts:

- Certain minimum flows are required in summer to keep salt water away from agricultural municipal industrial supply intakes in the Delta and to protect migrating fish.
- Winter flood surges from the Delta above a certain magnitude reduce salinity markedly throughout most of the Bay system. This effect persists for several months; many biologists believe that these changes play an important role in the life cycle of some of the fish, crabs and shrimps that live in the Bay.

The strategy for solving this problem has three parts: the first part accomplished here recommends the establishment of an interim flow allocation for estuarine preservation as part of the water quality objectives for the region, based on current knowledge. The second part includes studies to determine more accurately the amount of water necessary to preserve the estuary. The third part recommends to the State a permanent flow allocation for this purpose.

The San Joaquin Valley Agricultural Drain

Agricultural productivity in parts of the San Joaquin Valley is impaired by high groundwater levels. Consideration is being given to the construction of a drain designed to lower groundwater levels; this drain probably will discharge salty, nutrient-laden waters to the bay between Martinez and Antioch. If this occurs, water quality problems in the bay can be minimized by establishing appropriate quality standards for the drain discharge. The standards will be developed in the next several months in cooperation with the Interagency Drainage Program and recommended to the State for adoption.

Accidental Spills

The quantities of oil, petrochemicals and other hazardous materials being processed in, and transported through, the Bay Area are considerable. The risk of a large damaging spill continues to exist; hundreds of smaller spills occur annually. At present, responsibility for spill prevention and clean-up is shared by many agencies at different levels of government. These agencies, along with private industry, have developed extensive programs for dealing with all spills, with an emphasis placed on petrochemicals. However, due to the number of regulations, agencies and private organizations involved, it is difficult to determine the effectiveness of present practices. Instances of poor interagency coordination and inconsistencies in regulations have been noted. The Federal government recently issued new regulations defining what constitutes a spill of hazardous materials and establishing penalties for accidental spills. It is too early to determine the full effect of these new regulations. The best approach appears to be to monitor the implementation of the new regulations for a year and if doubts about the effectiveness of existing practices still exist conduct two studies. One study would deal with non-petrochemical spills into offshore and bay waters. The other would deal with inland spills. These studies would lead to the identification of any gaps in local arrangements for spill prevention and clean-up should they exist. Support of national and international efforts to regulate the construction and operation of vessels transporting hazardous materials is also recommended.

Miscellaneous Problems

Localized water pollution problems are caused by failing septic tanks, discharges from vessels in confined waters and dredging activities. Stricter, uniform standards for septic tanks together with public responsibility for maintenance of new and certain existing systems is the recommended strategy for on-site disposal problems. To deal with vessel wastes, public education programs and on-shore receiving facilities for wastes from pleasure craft holding tanks are recommended; more stringent measures may be necessary later. In all three categories noted here, monitoring and research programs are advised.

THE PLAN

The Water Quality Management Plan consists of a series of planning principles or policy statements. The statements are grouped into five individual management elements. Each policy statement is accompanied by a set of actions which lead toward implementation of the policy. The plan elements and their associated policies are as follows:

- Water Quality Management Element
 - Improve understanding of the San Francisco Bay-Delta System and the fate and effects of pollutants entering it.
 - Establish a continuing planning process for water quality management.
 - Ensure that water pollution control facilities or measures effectively protect water quality.
 - Re-establish recreational and commercial shellfish harvesting in San Francisco Bay
- Municipal Facilities Element
 - Provide facilities for municipal sewerage service and water quality protection.
 - Encourage consolidation of treatment facilities and discharge of wastewater to well-mixed receiving waters.
 - Accelerate progress toward wastewater reclamation and reuse.
- Surface Runoff Element
 - Establish a program of surface runoff controls that emphasizes low-cost measures to reduce the pollutant load from this source.

- **Industrial Dischargers Element**

- Provide facilities needed for industrial wastewater treatment and disposal and water quality protection.

- **Miscellaneous Sources Element**

- Improve wastewater disposal practices in unsewered areas.
- Reduce sewage pollution from small boats in marinas, harbors and environmentally sensitive areas.
- Monitor effectiveness of existing arrangements for preventing and cleaning up oil and chemical spills.

The plan elements are described briefly in the following section.

Water Quality Management Element

The water quality management element contains those actions that are necessary to protect water quality but do not relate to control of a particular pollutant source.

The formation of a San Francisco Bay Delta Research Advisory Council is recommended. The SFBDRAC would advise the State Water Resources Control Board and the Regional Water Quality Control Board in the following areas:

- improved and focused research on pollution cause and effect relationships due to toxic materials, the agricultural drain, reductions in delta outflow, and dredging.
- integration of dischargers' monitoring programs into a coordinated bay-wide data collection network.
- coordinate activities of other research organizations working in the bay, such as the United States Geological Survey.

The information gathered by these efforts will be used to make pollution control efforts more effective. Reorganization or redirection of receiving water monitoring will lead to an improvement in the quality of technical work at a reduced cost.

A procedure is recommended for updating the Water Quality Management Plan as information accumulates. The plan will also be updated as required to remain consistent with other regional environmental goals such as air quality maintenance and preservation of open space.

A number of actions are recommended to ensure that water pollution control facilities or measures do, in fact, protect water quality. Present receiving water quality monitoring arrangements will be modified to reduce fragmentation and improve understanding of the entire bay system. Effluent monitoring will remain the responsibility of dischargers. The results of monitoring will be compiled and published annually as a guide to progress in water pollution control.

Actions are recommended to permit re-establishment of shellfishing in San Francisco Bay. Actions include monitoring of shellfish quality in approved beds and patrolling to ensure harvesting does not occur at unapproved beds.

Municipal Facilities Element

The municipal facilities element includes a list of all sewage collection, treatment and disposal facilities needed in the next twenty-three years based on the compact growth actions recommended in the air quality maintenance plan. The facilities are needed to protect water quality and to provide sewerage service for the region's growing population. Responsibility for building, operating and maintaining the facilities belongs to the cities and special districts. The cost of building and operating the facilities will be equivalent to \$200 to \$240 million each year for the next twenty years expressed in 1977 dollars. Over 80 percent of the construction cost will be spent in the period 1977 through 1982.

Surface Runoff Element

The surface runoff element consists of individual surface runoff control plans developed by Marin, Sonoma, Napa, Solano, Contra Costa, Alameda, Santa Clara and San Mateo Counties together with San Francisco's existing plan. The plans are described in general terms here. The unabridged plans are contained in an Appendix. Seventeen major types of surface runoff control measures are recommended ranging from improving street sweeping practices to developing public education programs. A regionwide summary of control measures is shown in Table 1. The total cost of implementing the surface runoff plans for the initial period is estimated at approximately \$250,000 a year, minimum.

Industrial Dischargers Element

The industrial dischargers element addresses both industries that discharge wastewater directly to the environment and those that discharge to a municipal sewerage system. The element includes a list of all significant direct industrial discharges. If present Federal laws remain unchanged most of these direct dischargers must upgrade their level of waste

TABLE - 1

REGIONWIDE SUMMARY OF CONTROL MEASURES IN COUNTY SURFACE RUNOFF PLANS (IN ADDITION TO EXISTING PRACTICES)

	ALAMEDA	CONTRA COSTA	MARIN	NAPA	SAN MATEO	SANTA CLARA	SOLANO	SONOMA
Improve street sweeping	•	•	•	•	•	•	•	•
Control use of certain chemicals	•					•	•	
Clean stormwater collection system			•		•		•	•
Control littering	•		•		•			•
Control dumping	•	•		•	•	•	•	
Repair streets		•		•				
Insure proper operation of septic tanks							•	
Control erosion	•	•	•	•	•	•	•	•
Improve agricultural practices			•	•		•	•	•
Divert runoff from contaminated areas	•		•				•	•
Treat and store runoff				•		•		•
Control land use	•		•			•	•	
Establish water quality monitoring program	•	•	•	•	•	•	•	•
Establish a public education/information program	•	•	•	•	•	•	•	•
Establish a Surface Runoff administrative structure and/or procedures for continuing planning	•	•	•	•	•	•	•	•

treatment by 1983. The cost of constructing and operating new facilities is estimated to be equivalent to \$25 to \$50 million each year for the next twenty years expressed in 1977 dollars. Costs will be borne by individual industries.

The element requires that industrial wastewater discharged to a municipal sewerage system be pretreated to a degree necessary to protect the municipal treatment plant and its operating personnel from harm and to protect the ultimate receiving waters as currently required by the State. The degree of pretreatment necessary may be influenced in the future by the results of an imminent bay wide monitoring program sponsored by the State Water Resources Control Board. Federal pretreatment requirements are being revised at the present time; these revisions may also affect local pretreatment requirements.

Miscellaneous Sources Element

The miscellaneous sources element contains measures designed to prevent pollution from on-lot waste disposal systems (such as septic tanks), vessel discharges and accidental oil and chemical spills.

Establishment of uniform minimum guidelines for septic tank design and construction is recommended. Developments currently served by septic tanks and experiencing problems will be permitted to establish a public septic tank maintenance district as an alternative to sewer construction if there is a reasonable expectation that on-lot systems will work. Otherwise a sewer system must be built. For new developments to be served by on-lot systems public management will be required.

Actions recommended to deal with vessel discharges emphasize enforcement of existing or slightly strengthened regulations and boat owner education programs. If, after several years of monitoring these actions fail to solve the problem or if warranted as a result of public hearings, it may be necessary to prohibit vessel discharges in parts of the bay. Construction of holding tank pump-out facilities at all marinas and harbors will be required.

Responsibility for prevention and clean-up of oil and chemical spills is shared by many agencies. Because of this division of responsibility it is difficult for decision-makers and interested individuals to determine whether present practices are effective. New Federal regulations dealing with spills of hazardous materials have recently been published. Once the regulations have been implemented it may be necessary to conduct two studies to determine whether prevention and clean-up practices are now effective.

Section-B

LAWS, REGULATIONS AND EARLIER PLANS

This water quality management plan is the most recent in a series of plans dealing with water pollution control in the bay region. The preparation of each plan has been mandated by law. The laws themselves were enacted in response to citizen concern for environmental protection. This section describes the goal of the present plan and its specific legal mandate together with a more general description of water pollution control legislation and earlier plans.

GOALS AND OBJECTIVES

The goal of the water quality management program is to produce a plan that will lead to the greatest possible improvement in water quality and compliance with Federal and State standards and objectives at the earliest possible date. The plan will have no social, economic or secondary environmental effects so unacceptable as to prevent implementation.

LEGAL MANDATE

The Federal Water Pollution Control Act Amendments of 1972 provide the mandate for preparation of the plan. The Act states that:

"The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this Act--

- 1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;
- 2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;
- 3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;
- 4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;
- 5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each state."

The key goal of the Act is that swimmable and fishable waters be achieved wherever possible by 1983. The provisions of section 208 relevant to management of water quality in the Bay Area are discussed below.

Section 208 of the act requires the Governor to designate agencies to prepare and implement areawide waste treatment management plans for a designated area. Within two years after the planning process is initiated, the designated agency--in this case ABAG--is to prepare a plan that must be certified by the State Water Resources Control Board and subsequently approved by EPA. This plan is to include, but not be limited to, control measures for improving water quality and the institutional and financial mechanisms necessary to implement control measures for the following sources of water pollution:

- municipal wastewater
- industrial wastewater
- storm runoff
- other nonpoint sources

The agency is also to assess the social, environmental, and economic impacts of carrying out the plan. The Governor, in consultation with ABAG, will designate a management agency or agencies to implement the approved plan. No Federal grants for water pollution control facilities will be made to any agency not so designated, and no permit for the discharge of liquid wastes will be issued unless the discharge is consistent with the plan. The Act requires permits for all discharges to navigable waters.

WATER QUALITY MANAGEMENT PRIOR TO 1970

Water quality management is perhaps a rather grandiose description of water pollution control activities prior to the 1960s. Before 1949 the State Department of Public Health was responsible for the regulation of sewage disposal facilities. The Health Department issued discharge permits based on public health considerations alone; little or no attempt was made to protect fish and wildlife or aesthetic values. Municipalities and special districts built and operated sewage collection, treatment and disposal facilities in response to health department requirements and to citizen concerns regarding nuisance and aesthetics.

This approach was largely ineffective in dealing with bay pollution. In an effort to remedy the situation statewide the State Water Quality Control Board and nine Regional Water Quality Control Boards were established by the State Legislature in 1949. Although some progress was made it became clear that there was a need for an overall plan or grand strategy to provide direction for water pollution control activities. In 1965, the State Legislature authorized the State Board to conduct a study of the effects of waste discharges on the bay and delta and to develop a comprehensive plan for control of water pollution.

The study, known as the Bay-Delta or Kaiser Study, began in late 1966 and the final report was published in June 1969. The study considered a number of alternatives for controlling pollution. The conclusion was reached that the best alternative was one which involved eliminating discharges to the bay, conveying most of the wastewater to the Pacific Ocean and reclaiming the remainder for industrial and agricultural use.

The creation of a regional planning and operating agency was recommended to implement the program. The State Legislature failed to pass a bill forming such an agency. Without a suitable operating agency having regional authority, implementation of the plan became impossible.

LEGISLATIVE ACTIONS IN THE LATE 1960s AND EARLY 1970s

In 1967, the powers and responsibilities of two State agencies--the State Water Rights Board and the State Water Quality Control Board--were assigned to a new State Water Resources Control Board. In 1969, the legislature passed the Porter-Cologne Water Quality Control Act. This new law expanded the term "beneficial use" of California waters to include aesthetic enjoyment and preservation and enhancement of fish and wildlife. In addition, the law required that comprehensive water quality control plans be prepared for each of the sixteen major hydrographic basins in California. In the years following the passage of the Federal Water Pollution Control Act Amendments of 1972 the provisions of the Porter-Cologne Act were amended to complement the new Federal legislation.

The passage of the Federal Water Pollution Control Act Amendments in 1972 represented a radical departure from the philosophy which had underlain all previous State and Federal water pollution control legislation. In the past, legislation had emphasized the establishment of in-stream water quality standards to protect beneficial uses and had not specified effluent quality at the end of the pipe provided no violation of in-stream standards occurred. Because the cause and effect relationship between waste discharges and pollution in the receiving water is often poorly understood, establishment of a level of waste treatment or effluent requirements for a particular discharge frequently became the subject of controversy and extended discussion. In many parts of the nation the progress of water pollution control was severely hampered by these controversies and the delays they caused.

Recognizing these difficulties, the authors of PL92-500 refocused regulation on the quality of discharged waste as it emerged from the pipe regardless of the characteristics of the receiving waters. All discharges to navigable waters must be of a specified improved quality before discharge can be permitted. A minimum level of treatment for all discharges was set.

THE WATER QUALITY CONTROL OR BASIN PLAN

In order to comply with the provisions of both the Porter-Cologne Act and the Federal Water Pollution Control Act Amendments, the State Water Resources Control Board and the Regional Water Quality Control Board undertook to prepare a water quality management plan for the San Francisco Bay basin.

Aware of the fate of the earlier Bay-Delta Plan the basin planners decided on a different approach. Rather than developing a plan that would have to be implemented by a new "super" agency, it was decided that the new plan must be acceptable to and implementable by existing agencies whenever possible. Consequently the Basin Plan was shaped at least as much by political considerations as by technical analysis of water quality problems.

The basin planners were helped somewhat in their endeavors by the fact that sub-regional plans for sewerage service had been completed or at least initiated throughout the area in the interval between publication of the Bay-Delta study and the start of basin planning. Although critical of the large-scale consolidation, proposed in the Bay-Delta study many local sewerage agencies agreed that some degree of consolidation was economically advantageous. Consequently a number of joint powers agreements were signed and twelve subregional planning studies were conducted between 1970 and 1973. The results of these studies formed the basis of the Basin Plan.

THE SECTION 201 FACILITIES PLANS

Section 201 of the Federal Water Pollution Control Act Amendments requires that applicants for grants for construction of municipal wastewater facilities must demonstrate that they have thoroughly studied and evaluated all reasonable alternative waste management techniques that will accomplish the proposed projects objectives. Section 201 facilities planning studies are preliminary engineering studies and represent the last planning step before proceeding with design and construction. Studies of this type have been completed or are in progress throughout the Bay Area and must conform with the overall Basin Plan. In the future they must conform with the EMP.

The decision was made, early in the Environmental Management Program, to treat the facilities recommended in the Section 201 plans as if they were already built in order to avoid delaying compliance with Federal requirements. This plan did not reexamine issues already settled in the Section 201 planning process.

RELATIONSHIP BETWEEN THIS PLAN AND EARLIER PLANS

It is evident from the foregoing that the portion of the EMP that deals with water quality management is one of a series of plans. This is to be expected; environmental planning is a dynamic process; any plans must be adapted to changing circumstances. Apart from the fact that

the present plan updates earlier plans, there are three other important differences. Unlike the earlier plans this plan integrates air, water and solid waste planning. Secondly, this plan has been prepared locally and is guided by a policy body of elected officials and other interest group representatives. Thirdly, this plan emphasizes consideration of non-point sources of water pollutants.

The relationship between this and other plans is best described by comparing the present situation with that which will exist when this plan is completed and approved. At present the Basin Plan is the document that guides water quality management. The Basin Plan describes the level of water quality that must be attained and an outline of the actions that must be taken to attain it. The Basin Plan is shaped principally by State and Federal water quality requirements and does not take account of other environmental goals such as air quality protection. The Section 201 facilities plans -- those plans that describe in detail the wastewater facilities needed -- must conform with the Basin Plan.

After the EMP is adopted in April 1978 it will replace the Basin Plan as the instrument guiding water quality management. The EMP is shaped not only by State and Federal legal requirements but also by local environmental tradeoffs and priorities. The Section 201 facilities plans must in the future conform with the EMP.

Section-C

WATER POLLUTION PROBLEMS AND THEIR CAUSES

This section describes the water resources of the San Francisco Bay Region, the sources of pollutants that affect them and the nature and seriousness of existing and future water quality problems.

WATER RESOURCES OF THE BAY REGION

The predominant topographic feature of the region is the San Francisco Bay - Sacramento/San Joaquin Delta System. This is the focal point of the description of regional water resources. Figure 1 shows the surface waters of the region.

THE BAY - DELTA SYSTEM

San Francisco Bay extends from the east end of Chipps Island, near the City of Pittsburg where the Sacramento and San Joaquin Rivers meet, to the mouth of Coyote Creek, near the City of San Jose. Halfway between the bay's extremities, the Golden Gate is the bay's only link with the ocean. At mean tide the surface area of the bay is approximately 435 square miles.

The bay is quite shallow with an average depth of only 20 feet. Apart from the dredged channels, deep water areas are mostly confined to the Central Bay (San Francisco - Oakland Bay Bridge to Point Richmond). The depth of the South Bay averages 15 feet and the North Bay 17 feet.

Water movements within the bay are influenced in a complicated way by wind, tides and precipitation runoff. Ocean water enters the bay through the Golden Gate as the tide rises. Freshwater enters the bay from surface streams, principally the Sacramento-San Joaquin Delta, and waste discharges. Water leaves the bay through the Golden Gate as the tide ebbs and some is evaporated from the water surface.

At low tide the bay contains 210 billion cubic feet of water. The volume of water between mean-higher high water and mean lower-low water, referred to as the tidal prism, is approximately 50 billion cubic feet. This amount of water leaves the bay through the Golden Gate during the six-hour period between high- and low-tide and represents about one-quarter of the total volume of water within the bay at low tide. The tidal prism is almost equally divided between the North and South Bays; 25 billion cubic feet of water leave each during ebb tide.

As the tide rises, 50 billion cubic feet of water must enter the bay again. Not all the entering water is fresh ocean water, however. It is estimated that approximately three-quarters of the water entering the bay on the flood tide is the same water that just left a few hours previously on the ebb. Thus, the volume of new ocean water entering the bay with the incoming tide, the tidal exchange volume, is 12.5 billion cubic feet. Clearly a similar quantity of water must leave the bay on the ebb tide, never to return. This permanently exiting water provides the principal means by which pollutants can be moved out of the bay and into the Pacific Ocean. To a lesser extent, pollutants are carried out of the bay in the freshwater outflow from the delta.

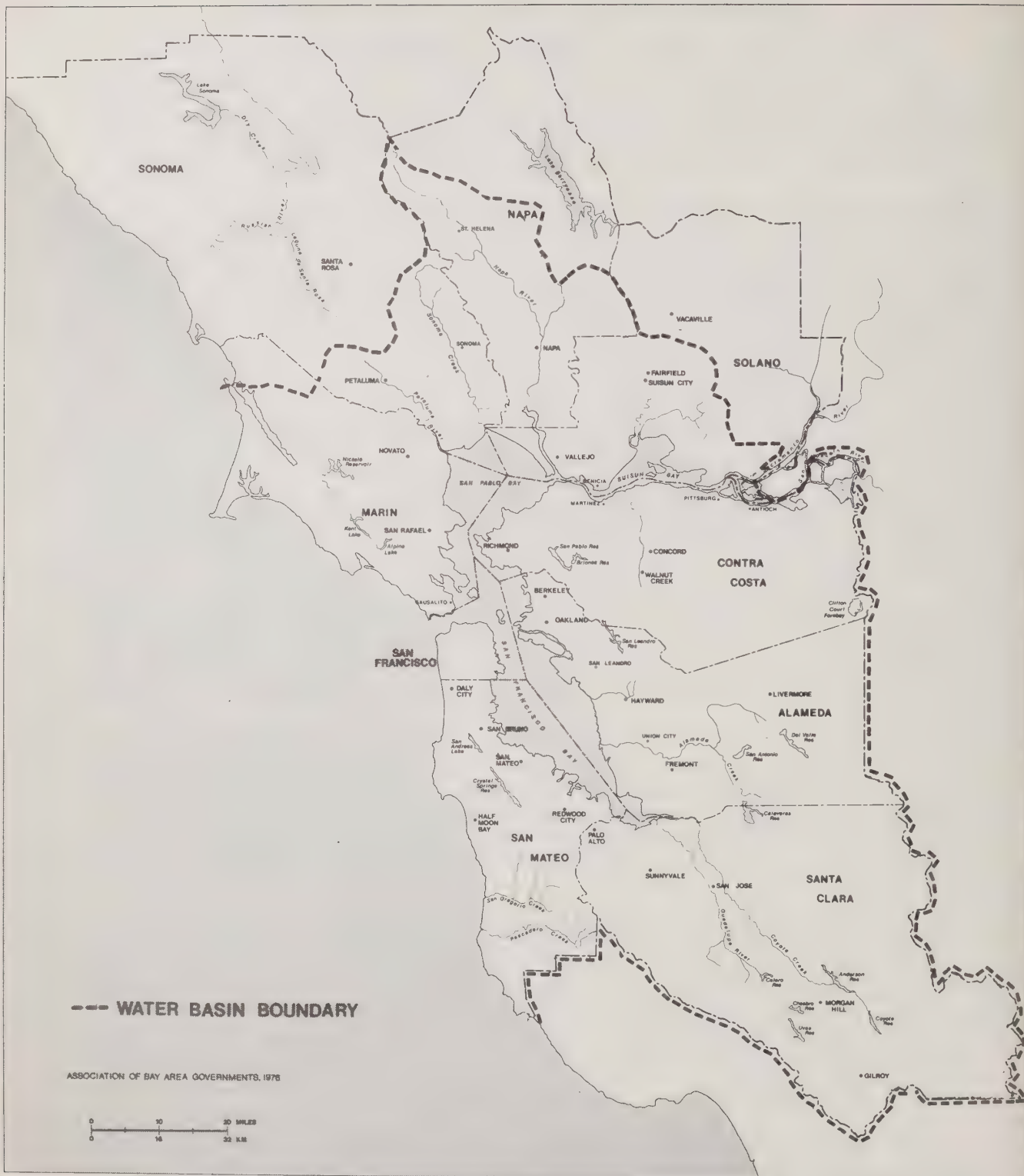


Figure 1.
Surface waters of the San Francisco Bay Region

Almost half of California lies within the watershed draining into San Francisco Bay through the Sacramento-San Joaquin Delta. Over 95 percent of the freshwater flow into the bay comes from the delta.

In the last fifty years freshwater outflow from the delta has been significantly reduced as a result of the construction of dams and diversions on the Sacramento and San Joaquin Rivers and their tributaries. Water is diverted from the delta by both the Federal Central Valley Project and the State Water Project for use in the San Joaquin Valley and in Southern California. Water is diverted from both the delta and upstream tributaries for use in Bay Area communities.

It is the large freshwater inflow to the bay that makes the bay an estuarine system rather than a simple embayment. The mixing of fresh and saline ocean waters produces an environment of great biological importance and productivity. The tidal marshes and mud flats that are abundant in the estuary are regarded by ecologists as among the most fertile of environments.

THE PACIFIC OCEAN

The portion of the Pacific Ocean that this plan addresses extends from Tomales Bay in the north to Point Año Nuevo near the Santa Cruz County line in the south and an undetermined distance offshore. The coastal waters of the region are cold, marine waters, their characteristics influenced by the southward flowing California Current and the seasonal upwelling of bottom waters. The coastal waters are also influenced markedly by the huge quantities of water moving in and out of the bay with the tide.

OTHER SURFACE WATERS

The other surface waters of the region include streams and rivers, lakes and reservoirs. With the notable exception of the Sacramento and San Joaquin Rivers, which are regarded here as part of the bay-delta system, the surface streams of the region are relatively insignificant. Principal among them are the Napa and Petaluma Rivers, Sonoma Creek, Alameda Creek, Coyote Creek and the Guadalupe River. Most of the smaller streams dry up in the summer.

The principal reservoirs and man-made lakes in the region are Lake Berryessa in Napa County, Crystal Springs Reservoir in San Mateo County, Nicasio Reservoir in Marin County, Calaveras and Anderson Reservoirs in Santa Clara County, Del Valle, San Antonio and San Leandro Reservoirs in Alameda County and San Pablo and Briones Reservoirs in Contra Costa County.

HISTORIC WATER QUALITY

Before man's intervention, water quality in the bay region was a function of complex but natural factors: the wind, the tides, the storms and their erosion products and the cycle of life in the waters. Now the equation has become still more complex with the addition of man's influences. The volume and character of freshwaters entering the bay have

changed as water has been diverted upstream of the delta and the land surface is converted from natural vegetation to city streets and crop acreage. The size of the bay itself has been reduced as the shallow tidal marshes have been filled and converted to urban uses. In addition, the bay has become a convenient dumping ground for the by-products of civilization, domestic sewage, industrial waste and agricultural return flows, and the incidental recipient of oil spills and aerial fallout.

The determination of whether the present level of water quality is satisfactory and, if not what can be done about it, lies at the heart of the present planning program and is consequently dealt with at length in the following section. That analysis can be placed in perspective, however, by some consideration of how water quality has changed in the past.

It is extremely difficult to develop a detailed picture of how water quality has changed in the region over the last two centuries for several reasons. Little definitive data was gathered until the 1950s. Even today, there is no comprehensive region-wide water quality monitoring program. In the absence of long-term data a subjective but useful picture of changing conditions can be pieced together from a variety of sources. A diagrammatic representation of how bay water quality has probably changed is shown in Figure 2.

Water quality and fisheries in the bay declined rapidly in the latter part of the nineteenth and first half of the twentieth centuries. During the last thirty years there has been an improvement in water quality as a result of the construction of wastewater treatment and disposal facilities. A number of water quality problems remain.

PRESENT WATER QUALITY PROBLEMS

The definition of a water quality problem used in this plan is "impairment of a desired beneficial use." As noted earlier, the Water Quality Control or Basin Plan identified existing and potential beneficial uses for the waters of the region. Thus the working definition of pollution is anything that prevents these beneficial uses from occurring either now or in the future. In addition, even where water quality is higher than is necessary to support beneficial use any action that degrades water quality is regarded as pollution.

A number of special studies were undertaken to identify and define existing water quality problems. Subjects investigated included fish-kills, shellfish contamination, toxicants, eutrophication, dredging and disposal, oil and chemical spills and delta outflow. Mathematical simulations of water quality were also made. The results of the studies are summarized here and included unabridged in the plan appendices.

Existing water quality problems and their probable causes are listed in Table 2. Problems reported in the individual county surface runoff plans are summarized in Table 3. In general the problems are thought to be caused by the discharge of pollutants from a variety of sources and by the reductions in freshwater flow into the bay from the delta that were described earlier. Some of the problems that were identified are described in the following paragraphs.

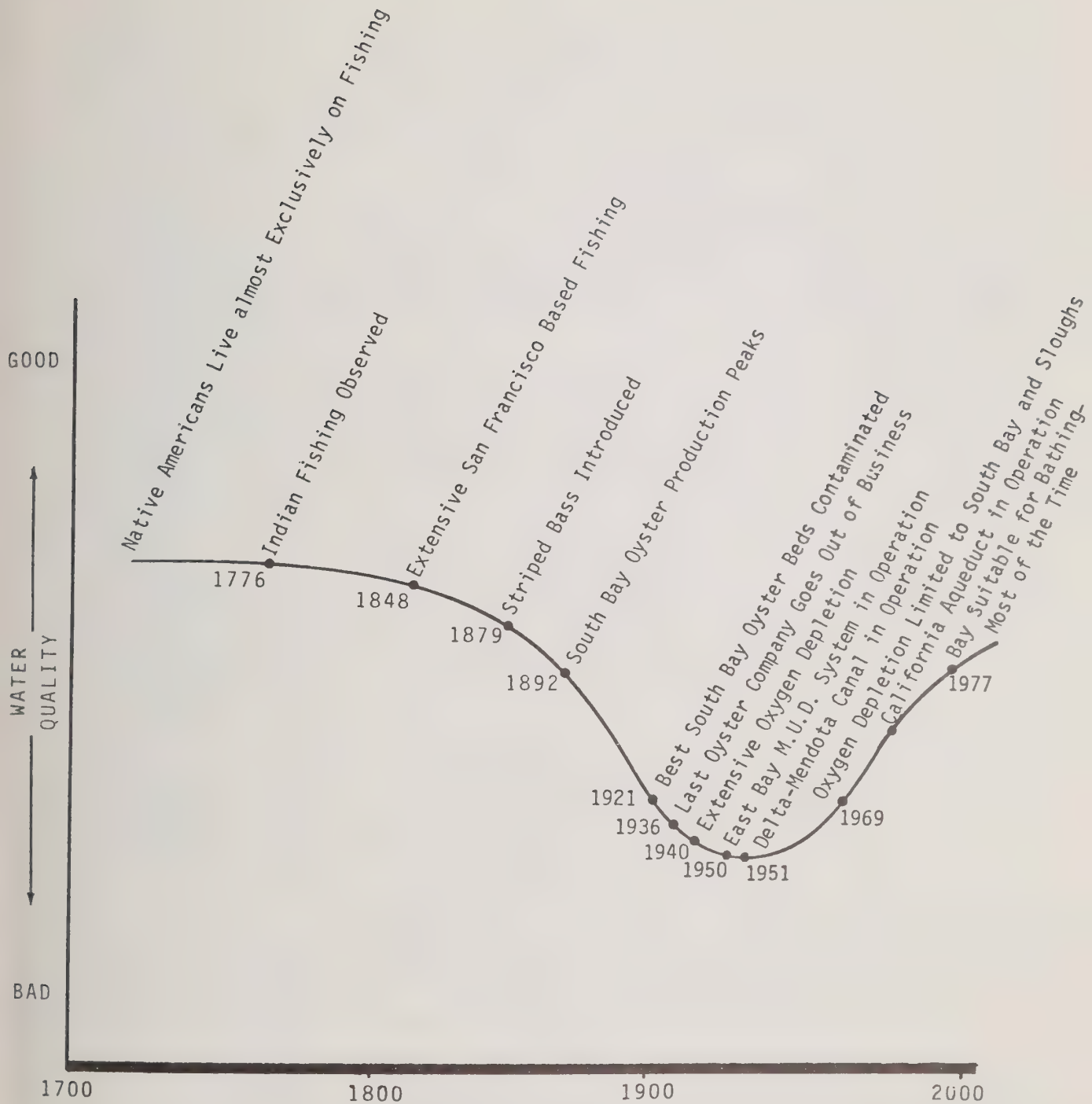


Figure 2.
Historic trend in water quality

TABLE 2

Bay Water Quality Problems and Their Causes

Impaired Beneficial Use	Water Quality Problem Resulting In Impairment of Beneficial Use	Probable Cause
Commercial and sport fishing - fish migration and spawning	Oxygen depletion, effects of toxic materials, reductions in freshwater flow	Municipal and industrial discharges, surface runoff, accidental spills, freshwater diversion
Water contact recreation	High bacteria counts, particularly near the shoreline after storms	Municipal discharges, vessel discharges, surface runoff, combined sewer overflows
Non water-contact recreation	Floating debris, oil slicks, algae blooms	Surface runoff, accidental spills, vessel wastes, municipal and industrial discharges, improper trash disposal
Shellfish harvesting	High bacteria, virus and metals concentration in shellfish flesh, neoplasms (abnormal growths) in mussels	Municipal and industrial discharges, surface runoff, vessel wastes
Wildlife Habitat	Oxygen depletion, effects of toxic materials, reduction in freshwater flow	Municipal and industrial discharges, surface runoff, accidental spills, freshwater diversion
Agricultural, Municipal and Domestic and Industrial Process Supply	Increased salinity	Reduction in freshwater outflow from delta

TABLE 3
SURFACE RUNOFF PROBLEMS REPORTED IN COUNTY PLANS

An "X" opposite a problem indicates that a problem exists. No attempt has been made to rank the severity of the problems. An "X" absent from a column does not necessarily mean that the particular problem is not found within that county.

PROBLEM	EFFECT	EXAMPLES	CO's WITH REPORTED PROBLEM									CAUSE
			Ala	CC	Mar	Nap	SM	SC	SoI	Son		
SILTATION/ EROSION	Makes water more turbid. Covers fish spawning beds. Generally clogs streams. Reduces reservoir capacity.	Lake Temescal, Ala. Co. Permanente & Adobe Cr., S.C. Co., Channels in Pacifica.	X	X	X	X	X	X	X	X		Improper construction or agricultural practices. Any practice which ex- poses bare soil to rain & runoff or any soil to excessive runoff.
GREASE & OIL	Unightly. Coats birds & aquatic life. Makes rec- reational use undesirable. Toxic to aquatic life.	Suisun Bay, Sol. CO., unnamed channel in Rich- mond. Streams & sloughs Milpitas, Sunnyvale & other S.C. Co. cities.	X	X			X	X	X			Industrial activity. Traffic. Dumping of motor oil & other floating sub- stances.
DEBRIS & LITTER	Unightly. Coats birds & aquatic life. Makes recreational use undesir- able.	Tidal flats around bay. Streams in So. S.C. Co. Most cities in Ala. Co.	X	X	X	X	X	X	X	X		Improper dumping & refuse disposal & general litter- ing where material can be washed off.
BACTERIAL CONTAMIN- ATION	Indicative of presence of fecal material. Con- tact/ingestion can cause disease. Contaminates aquatic life in specific areas, especially shell- fish. Eliminates rec- reational uses depend- ing on level of contam- ination.	Suisun Bay, Sol. Co. Lake Merritt & Lake Temescal, Ala. Co. Various streams in So. S.C. Co. Bolinas Lag- oon & Richardson Bay, Marin Co. Certain shell fish beds in S.M. Co.	X	X	X	X	X	X	X	X		Deposit of animal fecal material in areas subject to runoff. Cross connec- tions with sanitary sewers. Malfunctioning septic tanks.
NUTRIENTS/ ALGAE GROWTH	Algae can cause taste & odors in drinking water. Can result in low con- centrations of dissolved oxygen. Some is good; too much is bad. Hard to control once started in relatively confined water.	Napa R; Milliken, Rec- tor & Bell Canyon Res. & Lake Hennessey in Napa Co. Lower Sonoma Cr., Suisun & Honkers Bay, Sol. Co. Bolinas Lagoon, Marin Co. Sloughs in S.C. Co. Lagoons in S.M. Co.	X		X	X	X	X	X	X		From natural organic mat- erial, fertilizers, in- dustrial runoff, traffic.
HEAVY METALS PESTICIDES & OTHER TOXIC CHEMICALS	Toxic to aquatic life. Tendency to magnify in food chain, i.e. lower forms have relatively low concentrations in body tissue, higher forms (fish & aquatic birds) have high concentra- tions.	Mercury in Almaden & Calero Res. & down- town creeks in S.C. Co. Suisun & Grizzly Bays in Sol. Co.	X		X		X	X	X			Automobile operation, run- off from industrial areas. Runoff from refuse and garbage. Leaching of mine tailings.
ORGANIC WASTES/LOW DISSOLVED OXYGEN	Dissolved oxygen essen- tial to most desirable forms of aquatic life.	Napa R., Lower Sonoma Cr., Suisun Slough in Sol. Co. Lower Petaluma R. in Son. Co., sloughs in S.C. Co.			X	X		X	X	X		Addition of organic mat- erial (eaten by bacteria in water, bacteria use dissolved oxygen in pro- cess) organic material from soil/plant origin or from traffic or industrial activities.

- Beds of mussels, oysters, and clams are widespread and well-populated in the bay. They are an untapped resource. Commercial and recreational harvesting are prohibited because the shellfish are often contaminated by bacteria, viruses and in some cases heavy metals. Sources of contamination include storm runoff, sewage discharges, waste from boats and ships and accidental spills. Dredging and dredge spoil disposal have isolated effects.
- There is some evidence suggesting that animal species living in or depending on the bay area are being adversely affected by toxic materials. For example, there has been an increase in premature births in harbor seals. There is evidence that egg shells of the peregrine falcon are thinner than is desirable for reliable reproduction; the same phenomenon has been observed for other birds such as the ashly petrel and common murre. These effects are associated with derivatives of DDT, which has been banned. Other pesticides and organic compounds are now showing up in analyses of bay waters. Heavy metals are found in bay waters and sediments. There are only a few places where these substances are at levels of acute toxicity, but little is known of their long-term effects. Mussels in the bay have been found with abnormal growths and the dungeness crab once an important commercial resource in the bay and in ocean waters off the Golden Gate has all but disappeared--perhaps as a result of pollution. All of these examples point to pollutants that occur at low concentrations in water and whose effects are cumulative and/or long term.
- Fish kills continue to occur in the bay for unknown reasons.
- Fresh water coming from the Sacramento-San Joaquin Delta affects the bay system except south of Dumbarton Bridge. Changes in delta outflow--in its quality or in the way the flow fluctuates--could have substantial effects on aquatic life in the bay.
- Oxygen depletion, which can destroy aquatic life, occurs in sloughs receiving waste discharges and in other parts of the bay where waters are poorly circulated.
- There are localized areas where algal or plant growth is a problem. Alameda Beach is one area, parts of Suisun Bay are another. Nutrients in sewage or storm runoff can stimulate this growth. The proposed agricultural drain that would carry nutrient-rich water from the Central Valley to the north bay could cause serious problems.
- The beauty of the bay is adversely affected by litter and debris. The major source of this is storm runoff and in some instances, spills of oils or chemicals.
- Bacteriological standards and acceptable heavy metals levels are exceeded in Richardson Bay, parts of San Pablo Bay and in the extreme South Bay during and just after storms.

POLLUTANT SOURCES

The waters of the region are affected by pollutants from a wide variety of sources. Sources can be divided into two groups: point sources of pollutants and non-point or diffuse sources of pollutants. Point sources are those that discharge pollutants to the natural waters at a single easily identifiable location. Examples of point sources are municipal and industrial wastewater treatment plant discharges. Non-point sources are those that cause pollutants to enter the receiving waters at many locations. Examples of non-point sources are aerial fallout, surface runoff and vessel wastes. Figure 3 shows the expected trend in waste flows and loads from different sources between 1975 and 2000. The waste load estimates are based on ABAG's Series 3, population, land use and employment projections. The higher projection was used which estimates a regional population of 6.1 million in the year 2000. The drop in certain pollutant loads from municipal and industrial sources in the near future are the result of presently planned (or under construction) facilities coming into operation. No additional controls of other pollutant sources are assumed.

Flows and loads entering the region from the Sacramento-San Joaquin Delta and from the proposed San Joaquin Valley agricultural drain are included for comparison.

Some conclusions that can be drawn from the figure are:

- By far the most significant source of fresh water to the bay is the outflow from the delta. All other sources are small in comparison. Delta outflow is a major or at least significant source of most pollutants, as well. However, pollutant concentrations are generally quite small in delta outflow. The large water volume is responsible for relatively large pollutant volumes.
- Biochemical Oxygen Demand (BOD) is a measure of organic material in the water readily available to bacteria as food. Elevated BOD levels enable bacteria to multiply significantly, using up dissolved oxygen in the water. Adequate dissolved oxygen is essential for fish, shellfish and all other aquatic animal species. The largest present BOD contributing category is that of point sources. By 1985, compliance with current requirements will markedly reduce this contribution.
- Nitrogen (chemically combined, not free atmospheric nitrogen) is a major plant nutrient that, in many water bodies, can be responsible for nuisance blooms of algae. The point source category is the largest contributor, and new treatment programs will not affect this much. Delta outflow is significant, but the concentration levels are low. The proposed agricultural drain, if built, will become a significant contributor unless nitrogen concentrations are reduced by treatment.

- Total Equivalent Heavy Metals is a weighted composite measurement of the amounts of eight reasonably common toxic metals being discharged. Any of these, in sufficient concentration, can have damaging effects on aquatic animals and plants. The largest contributing sources are surface runoff and delta outflow. The concentration levels in delta outflow and in surface runoff from non-urban areas are quite low. In surface runoff from urban areas, estimated concentrations are an order of magnitude higher. The larger part of surface runoff heavy metals comes from urban areas.
- Total Suspended Solids (TSS) is finely divided solid material in water, removable by filtration. The major source category is Delta outflow, where the material is mainly silt and clay particles. From point sources, particularly municipal treatment plants, TSS is largely organic material. From surface runoff, TSS is a mixture of soil and organic particles. A substantial part of the heavy metal load, as well as other toxicants, is associated with the suspended solids.
- Phosphorus, like nitrogen, is a major plant nutrient. The major contributing category is that of point sources. New treatment capabilities will not reduce phosphorus loads to the Bay.

Figure 3.

Fresh water and pollutants entering the bay

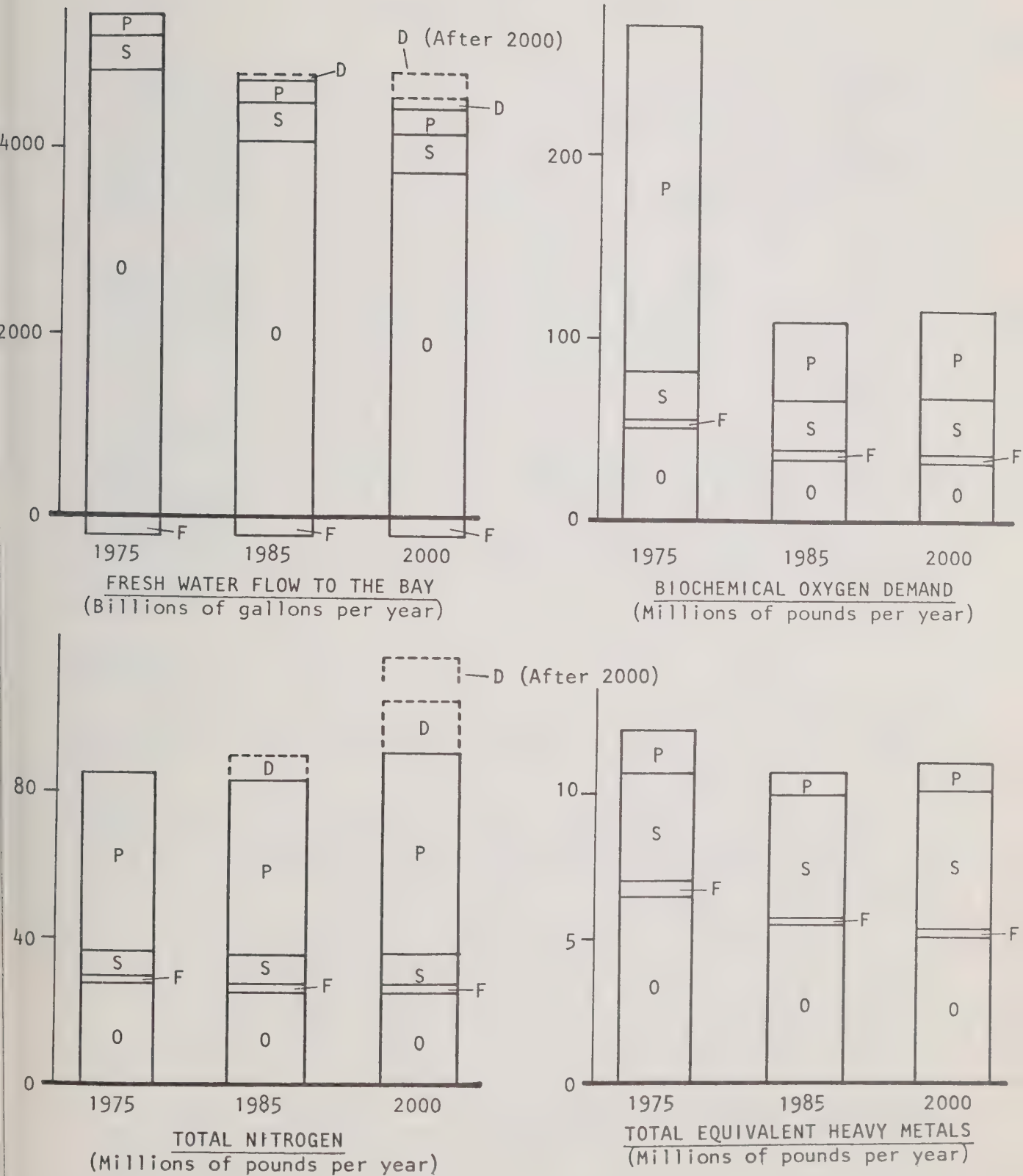
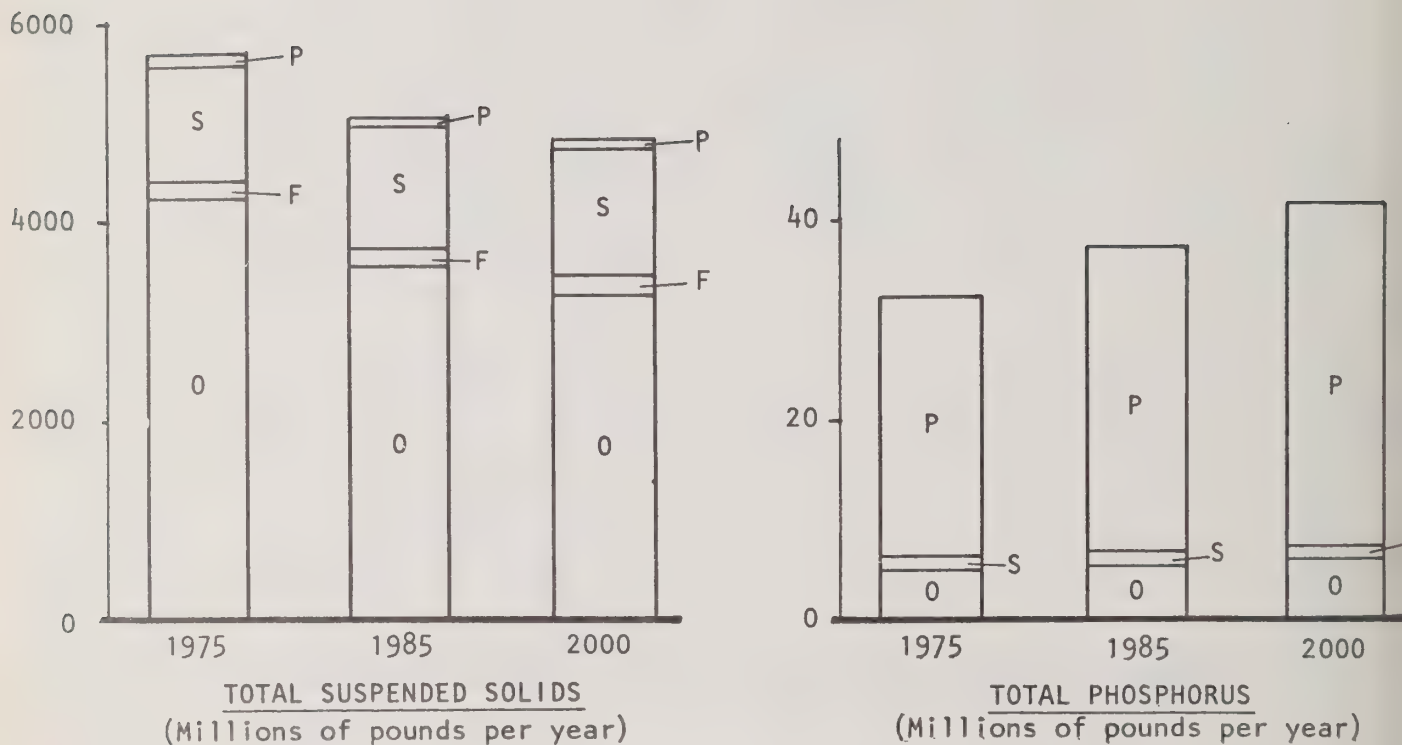


FIGURE 3., Cont'd.



NOTES: P = point sources (municipal and industrial discharges).

S = surface runoff.

F = fallout over bay from atmosphere (rainfall and dustfall).
"Flow" in this category = evaporation less precipitation,
a net removal of water.

O = outflow from Sacramento-San Joaquin Delta to bay.
Pollutant loadings in this category are very approximate.

D = proposed San Joaquin Valley agricultural drain.

Section-D

POSSIBLE SOLUTIONS

Before solutions to the remaining water pollution problems can be found, a detailed analysis of the problem must be undertaken. The problem analysis proceeds in two steps. First, it is necessary to determine which of the existing water quality problems will remain when presently planned wastewater facilities are built. Second, various methods for reducing the pollutant loads responsible for the remaining water quality problems must be evaluated and the most effective identified.

Based on an analysis of the trend in waste loads imposed on the surface waters and on the results of water quality simulations, it was concluded that most of the more obvious problems, oxygen depletion in the South Bay and in the sloughs receiving waste discharge and bacteriological contamination due to inadequately disinfected effluents, will recede as presently planned wastewater facilities come into operation. The most serious problems that will remain will be those that result from the discharge of toxic materials to the bay; bacterial contamination of shellfish after storms and other surface runoff-related problems and the reductions in freshwater inflow from the delta. Lesser or localized problems will result from failing septic tank systems, vessel discharges and accidental oil and chemical spills. The discharge of agricultural wastewater from the proposed San Joaquin Valley may also pose problems. Remaining problems and possible solutions to them are described in this section.

CONTROL OF TOXIC MATERIALS

Some investigators believe that certain toxic materials are responsible for some of the adverse effects on aquatic life mentioned in the previous section. Toxic materials emanate from a variety of sources.

There are three ways to reduce toxicant loads to the surface waters of the region: control of surface runoff, additional municipal and industrial wastewater treatment before discharge and elimination of discharges to surface waters by reclaiming wastewater and using it on the land.

Control of Toxic Materials in Surface Runoff

It is estimated that about 40 percent of total metals entering the bay originates from surface runoff. A considerable proportion of the synthetic organics is also thought to be contained in polluted runoff.

Certain types of surface runoff control measures have the potential for reducing the total amount of toxic material available for flushing into the bay at a relatively low cost. Present street-cleaning programs are

not designed with surface runoff control in mind. Their principal purpose is the removal of unsightly litter and to a lesser degree rat and insect control. Relatively minor changes in existing programs can be expected to reap considerable benefits by improving the pick-up rate of fine particulate material from the curbside, the source of much of the toxic metals. Thus, unlike further treatment of municipal and industrial wastewaters, surface runoff controls offer a means of reducing the input of toxicants to surface waters at a modest cost. Although data on the effectiveness of street-sweeping in removing particular substances are sparse it appears that conventional equipment can remove 25 to 65 percent of accumulated heavy metals.

Additional Treatment of Point Sources

Toxic materials are contained in both municipal and industrial wastewaters. Some of these toxic materials are removed by conventional wastewater treatment provided at existing and planned treatment facilities. These facilities are not designed specifically to remove toxic materials, however. Additional removals can be obtained by using more advanced treatment processes.

Within the region most of the heavy metals discharged from point sources are contained in treated municipal wastewater. Industries that discharge wastewater directly to the environment (direct industrial sources) do not appear to contribute large toxicant loads although information on the subject is rather sparse. About half the metals in municipal wastewater comes from homes, the remainder coming from industries that discharge to the municipal sewer (indirect industrial sources). The metals contained in domestic wastewater come from very diffuse sources which are almost impossible to control. Examples are lead and zinc dissolved from plumbing fixtures in homes. In the case of the indirect industrial sources, a large fraction of the metals frequently emanate from a small number of plants or workshops and are inherently easier to control. Typical sources are independent metal plating and finishing shops, electronic equipment manufacturers and photographic processors.

Most metals can be removed from wastewaters by a chemical precipitation process. In terms of total metals removed per dollar invested in treatment, it is usually more cost-effective to treat a few concentrated waste streams near their source than to treat the entire rather dilute municipal wastewater stream at the municipal treatment plant. The same reasoning holds true for synthetic organics although in this case the most appropriate treatment process is carbon absorption. Thus the objective of removing additional toxicants from the municipal waste stream can usually be accomplished more efficiently by selective pretreatment of industrial wastewaters rather than by increasing levels of treatment at the municipal plant.

Discharge Elimination

An effective way to prevent toxicants from entering surface waters is to reclaim wastewaters and eliminate the discharges to surface waters. Reclamation opportunities are limited, however, by the fact that the

trace metals and synthetic organic compounds that pose a threat to aquatic life may also threaten human health or the quality of soils and groundwaters. At present, and for the foreseeable future, reclaimed wastewater can only be used for secondary uses that do not involve human ingestion, such as landscape irrigation and industrial cooling.

In 1975 approximately 2 percent of the municipal wastewater generated in the Bay Area was reclaimed. In general, wastewater reclamation is only practiced where there is an acute need for water, where unusual circumstances make reclaimed wastewater prices competitive with other water supplies or where discharge to surface waters is prohibited or stringently regulated. Even if the financial problems can be overcome, the limitation on uses for reclaimed water prevents development of a market which will absorb the total wastewater flow from the bay region.

It should be emphasized that reclamation does not render toxicants harmless. Metals may build up in soils irrigated with wastewater to levels that inhibit plant growth. Toxicants contained in wastewater should be reduced to the lowest practical level before the wastewater is reused. It can be argued, however, that the residual toxicants are best disposed of on land where they are less likely to be reconcentrated through the biological food web than in an estuary.

Control Strategy

Although toxic materials are suspected to be the cause of certain negative characteristics of aquatic life in the bay the evidence is by no means conclusive. In addition, the removal of toxic materials from waste discharges and surface runoff is often difficult and expensive. It appears imprudent to embark on a costly program of toxicant controls in the absence of a good understanding of how toxic materials are affecting aquatic life. The recommended control strategy is to reduce the discharge of toxic substances where this can be done easily and relatively inexpensively. At the same time research will be undertaken to determine whether harmful effects are, indeed, occurring and if further removals are justified.

PREVENTION OF SHELLFISH CONTAMINATION BY BACTERIA

In the latter part of the last century and in the first decades of this one a flourishing shellfishing industry existed in the bay. Presently, although beds of mussels, oysters and clams remain widespread and well-populated, this resource is largely untapped. The shellfish are frequently contaminated and unsafe to eat.

Shellfish are filter-feeders; that is they pump water through their bodies filtering out the plankton and detritus that comprise their diet en route. As a consequence of this feeding method shellfish tend to concentrate within their bodies many of the substances contained in the overlying waters. Pathogenic bacteria and viruses, those that can cause disease in man, accumulate in shellfish if they are present in the overlying waters. The presence of this type of shellfish contamination in the bay is the reason for the prohibition of commercial shellfishing.

Two types of actions are necessary before shellfish harvesting could be reestablished in the Bay. The discharge of substances that contaminate shellfish must be prevented or reduced to an acceptable level. Regulatory actions must be taken to ensure that the shellfish that are harvested are, indeed, safe for human consumption.

The principal sources of pathogenic organisms are municipal sewage discharges, surface runoff, combined sewer overflows and vessel discharges. When the present program of wastewater treatment plant construction is completed, municipal discharges will become an insignificant source of bacteria. The new facilities include effective effluent disinfection systems. Combined sewage overflows, that is overflows from combined sewage and stormwater collection systems during storms, are the subject of on-going control programs in San Francisco and Oakland, the only communities in the region that have them. Bacteria pollution caused by vessel discharges can be controlled by increasing regulation of this pollutant source. A program of vessel discharge controls is discussed in the subsequent section entitled miscellaneous problems. Bacterial pollution caused by surface runoff can be reduced by the same types of low-cost control measures as those used to control toxic materials.

Regulatory actions necessary to reestablish recreational shellfishing are probably more easily accomplished than those necessary to reestablish commercial shellfish harvesting. A preliminary survey and sanitary assessment of shellfish beds will be necessary for the former. Based on the survey findings selected beds could be opened for recreational harvesting provided they were continually monitored for shellfish quality. Patrols would be necessary to ensure that shellfish are not taken from unapproved beds.

The State Department of Health believes that depuration or relaying is absolutely essential for any commercial shellfishing in the Bay under present and probable future water quality conditions. Depuration and relaying are two methods for ridding shellfish of contaminants. Depuration involves holding harvested shellfish in tanks of clean water for several days before sale. Relaying involves transferring shellfish to an area known to be free of contamination for several days prior to re-harvesting for sale. Pilot studies of the effectiveness of these practices would be required before the Health Department would consider permitting commercial harvesting.

PREVENTION OF SURFACE RUNOFF RELATED PROBLEMS

In addition to being a major contributor to the toxic material and shellfish contamination problems discussed previously surface runoff can cause siltation of lakes and reservoirs, aesthetic degradation, nutrient enrichment and oxygen depletion. All of these problems can be ameliorated by reducing the total pollutant load contained in surface runoff.

Measures to control surface runoff pollution fall into four categories; measures that reduce accumulation of pollutants prior to runoff, measures that reduce soil erosion, measures that control land use in sensitive areas and measures that treat and store runoff.

Measures that reduce accumulation of pollutants

The availability of pollutants for flushing into waterbodies can be reduced by revising street sweeping schedules to concentrate effort just before and during the rainy season. Other street sweeping improvements include parking restrictions to allow better sweeper access to curb areas and street sweeper operator training programs to increase awareness of the surface runoff problem.

The availability of herbicides, pesticides and fertilizers for flushing into water bodies can be reduced by restricting the use of certain chemicals and by establishing programs to heighten public awareness to the problems caused by excessive or careless use of agricultural and horticultural chemicals. Strict enforcement of anti-littering ordinances can reduce the surface runoff problem as can a program to protect watercourses from dumping of household and garden wastes. Waste oil from automobiles is commonly dumped into storm sewers despite being prohibited in most communities. This practice could be reduced by public education programs and by establishing waste oil recycling or disposal centers.

During the dry season debris accumulates in catchbasins and storm sewers. Cleaning programs can be scheduled to remove much of this material before the rains begin.

Measures that reduce soil erosion

Soil erosion in urban and suburban areas can be reduced by establishing and enforcing erosion control ordinances. These ordinances can prohibit landscaping, drainage and grading practices that cause erosion at construction sites.

Streambanks and channels can be stabilized. In agricultural areas plowing and grazing practices can be modified to reduce erosion.

Measures to control land use

In particularly sensitive areas surface runoff problems can be prevented by controlling land use. Undeveloped buffer strips can be required along the sides of streams and rivers. Performance standards can be established for developments within water supply catchments.

Measures to treat and store runoff

The pollutant load contained in surface runoff can be reduced by treatment or storage. If surface runoff is captured in detention basins, stored briefly, and allowed to discharge to an adjacent water body at a controlled rate, part of the pollutant load settles out in the detention basin. Although effective, measures of this type require large land areas and are expensive.

Control Strategy

Although surface runoff clearly contains large quantities of pollutants its relationship to observed water quality problems remains uncertain. Modelling studies indicate that violations of bacteriological water quality standards may occur during and several days after, storms in Richardson Bay, north and west San Pablo Bay and in the extreme South Bay. Verifying field data is unavailable, however.

In addition to these uncertainties the effectiveness of many of the potential control measures remains questionable. Thus it would appear imprudent to embark on a strict program of surface runoff controls without further information. The recommended control strategy includes acquiring the necessary information while simultaneously initiating a modest low-cost control program. The program could be expanded in the future when the problem is better defined. Data acquisition would include further monitoring of water quality during and immediately after storms and demonstration projects to test the effectiveness of promising control measures. The initial control programs will emphasize low-cost measures, many of which have multiple benefits, and which are tantamount to good urban "housekeeping" practices.

MAINTENANCE OF FRESHWATER FLOW INTO THE BAY

Salinity levels in the delta and San Francisco Bay are closely linked to outflow rates from the delta. Certain minimum outflows are needed to protect a variety of beneficial water uses in and around the delta that depend on a supply of freshwater.

Total freshwater inflow to San Francisco Bay from the delta has declined since the 1930s as a result of upstream diversions. If presently planned additional diversions are made, freshwater flow will decline still further, as shown in Figure 4. Widespread concern over declining freshwater flows has been expressed. The focus of concern has been the need to maintain minimum flows during dry periods in order to protect migrating fish and to repel salt water. Although this remains a controversial issue it seems reasonable to expect that once the information gathered during recent public hearings is evaluated, the responsible agency, the State Water Resources Control Board, will adopt low-flow standards which will satisfactorily protect beneficial uses of the bay-delta system as part of its new water quality control plan for the delta. In fact, the existence of dams and reservoirs upstream of the delta allows the release of stored water to maintain minimum flows greater than those experienced under natural conditions.

A second concern is becoming evident. The large winter-time flood flows, often regarded as wasted water, may also be crucial to the health of the bay. Recent experimental work conducted as part of this plan has indicated that increases in delta outflow of at least 10,000 to 15,000 cfs over a period of five to ten days cause salinity changes throughout most of the bay system. These changes often persist for many months after the flood; that is parts of the bay remain less salty than the ocean for an extended period of time. There is growing but inconclusive evidence that these salinity changes play a major role in maintaining the estuarine ecosystem.

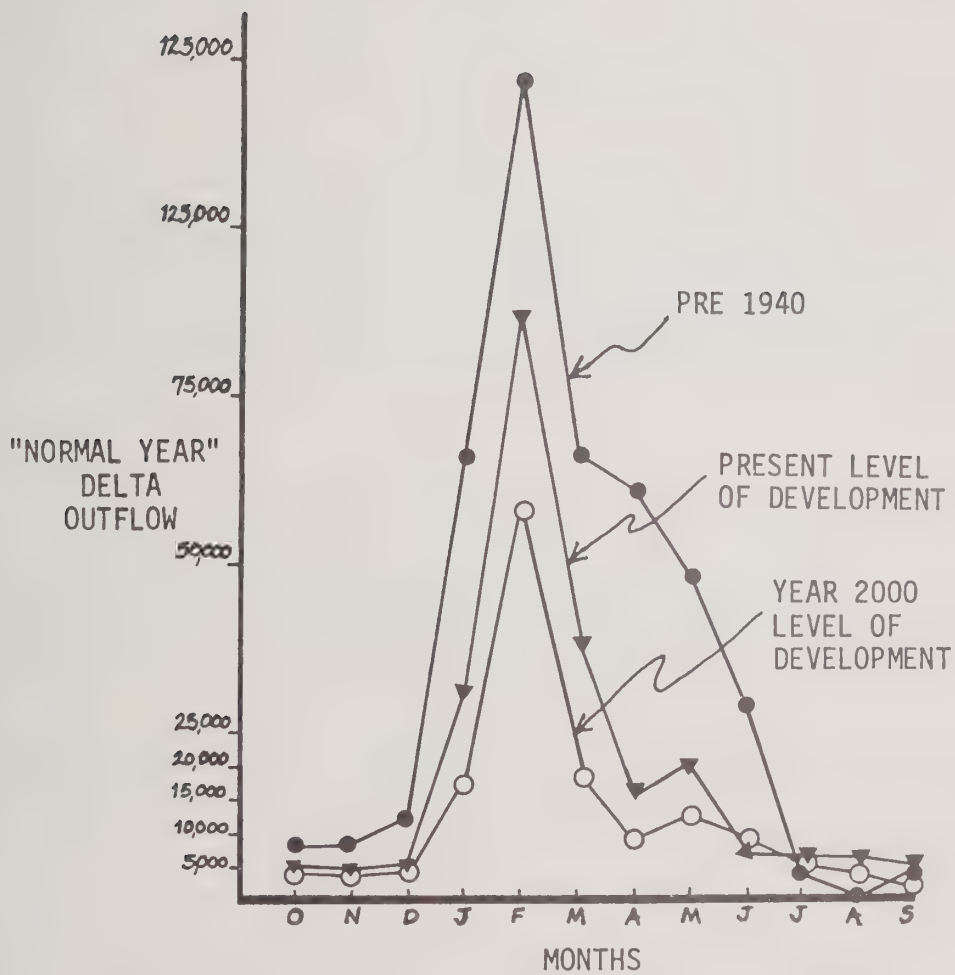


Figure 4.

Trend in delta outflow

Increases in delta outflow of the type which cause the salinity changes appear to have occurred in every year for which historical records are available except this year, the driest on record. If no action is taken it is likely that flows sufficiently large to cause major salinity changes will occur much less frequently. Under planned upstream management and diversion at 1990 levels, in average-to-wet years there will be ample uncommitted water to allow for several surge events in a year. It is in dry and critical years that specific provision must be made for elevated Delta outflow if a major salinity change is to occur.

The apparent best way to maintain an adequate freshwater flow into the bay system is to ensure that the State Water Resources Control Board includes in its new water quality control plan for the delta, standards that require that a certain volume of water be allocated for estuarine preservation. Studies will be necessary to determine the exact size of the allocation and characteristics of its release. It appears advisable, however, to establish an interim standard based on presently available information.

PREVENTION AND CLEAN-UP OF OIL AND CHEMICAL SPILLS

Few Bay Area residents could forget the 1971 tanker collision that resulted in almost one million gallons of oil being spilled to the Central Bay. Smaller spills go by unremarked even when their consequences are serious. In a recent nine month period, for example, the California Department of Fish and Game reported 255 accidental spills of oil and chemicals into surface waters in the Bay Area. Forty-two percent were of non-petroleum related chemicals and ranged from milk and wine to herbicides and sulfuric acid in quantities ranging from five gallons to several thousand gallons.

There are many facets to spill prevention and cleanup, only a few of which might be considered problem areas. There are a host of international, Federal, State and local regulations dealing with spill prevention and cleanup. Similarly, there are a large number of agencies involved in these activities. Federal preemption of ocean transportation and petrochemical industry controls has divided regulatory efforts with State and local agencies filling in the gaps. The result is a comprehensive attack on the spill problem which involves a large number of participants and relies heavily on good inter-agency coordination and cooperation. However, problem areas and possible corrective actions are difficult to identify because collection of data on spills is so decentralized and each agency tends to concentrate on the circumscribed areas of its own concern. Because oil spills on the water are clearly visible and comparatively easy to contain they have been the focus of most regulatory efforts. Two other areas identified as possible problems are offshore spills of non-petrochemical substances and inland spills which may reach a water body. In both cases it seems desirable that present practices should be studied in detail and recommendations for improvements made if shown to be necessary.

Two other approaches can be used to reduce the risk of accidental oil and chemical spills. One approach is to regulate the construction and operation of vessels and facilities or the installation of safety devices, such as in the proposed Department of Transportation construction standards for oil tankers. The second is to increase limits on the liability incurred by a spiller. This would provide an economic incentive to shippers and facilities for the installation of the latest, most effective safety devices. Personnel training would be improved, countering a frequent cause of spills--operator error.

A singular action that could reduce the risk of major oil tanker accidents would be the installation of a high resolution radar sub-station to cover San Pablo Bay and the Carquinez Straits. These segments of the bay have substantial tanker traffic. In the Central Bay the U.S. Coast Guard provides a comprehensive vessel traffic system composed of traffic lanes, bridge-to-bridge radio communication among ships and high resolution radar, equivalent to an airport's control tower system; this service could be extended upstream.

THE SAN JOAQUIN VALLEY AGRICULTURAL DRAIN

The problem of dropping productivity as a result of salt accumulation has plagued irrigated agriculture throughout history. In parts of the San Joaquin Valley the problem is particularly severe because high groundwater levels prevent salts from being leached out of soil. The economic importance of agriculture in the valley, to the state and the nation, is such that a solution is being sought despite the tremendous expense involved.

An exhaustive study of the problem and possible solutions is currently being conducted by the San Joaquin Valley Interagency Drainage Program (IDP). IDP, created in 1975, is a cooperative program sponsored by the U.S. Bureau of Reclamation, the California Department of Water Resources and the California State Water Resources Control Board.

The most obvious solution to the problem is to install subsurface drains to remove excess water and salts from the root zone. The lack of a valleywide management system for collecting and disposing of saline water from individual farms has prevented drain installation from taking place on a scale necessary to solve the problem.

The IDP has evaluated a number of alternatives for disposing of or re-using the water. At present the most promising alternative appears to be construction of a canal which would gather saline water from the subsurface drains and convey it northwards up the valley to a discharge point in Suisun Bay between Antioch and Martinez. The volume of the discharge is expected to increase from 200 mgd in 1990 to 800 mgd in 2060. Principal pollutants contained in the discharge will be salts and nitrogen. The discharge will not contain large quantities of pesticides because these are absorbed by the soil.

If built the drain could have an adverse effect on the San Francisco Bay-Delta system. The apparent best course of action for Bay Area interests is to ensure that discharge requirements are imposed on the drain that adequately protect the beneficial uses of the bay and delta.

OTHER CAUSES OF PROBLEMS

A number of activities cause minor water quality problems - failing septic tank systems, vessel discharges, dredging and mining activities.

Septic Tank and Other On-lot Disposal Systems

Approximately 100,000 or 6-percent of the Bay Area's households are served by on-lot waste disposal systems almost all of which are septic tanks. Although under favorable circumstances septic tanks provide a satisfactory method of waste disposal they often fail to do so for a variety of reasons. Common reasons for failure include inadequate design, poor construction, and inadequate maintenance. In some cases an on-lot disposal system is installed under topographic or soil conditions that will prevent it from functioning properly however well it is designed, built and maintained.

Failing septic tanks can cause water quality problems. Such problems have been reported in the Conn Creek/Lake Hennessey watershed and Edgerly Island in Napa County, North Petaluma Boulevard in Sonoma County, Stinson Beach in Marin County, Emerald Lakes watershed in San Mateo, and the Oakland Hills, Hayward Hills and Livermore area in Alameda County. Two solutions are apparent; the septic tanks could be replaced with a community sewage collection, treatment and disposal system or they could be rebuilt as necessary and properly maintained. The latter option is only available when soils, topography and lot sizes are such that individual on-lot systems can reasonably be expected to work.

In cases where new developments are proposed far from existing sewerage systems, it is necessary to decide whether waste disposal needs should be provided by on-lot systems or whether a sewer system should be built. If it can be demonstrated that on-lot systems will work satisfactorily they should be permitted, provided they are designed and built in accordance with best practices and that they are properly maintained. Public management of the systems would ensure proper maintenance.

Vessel Discharges

In 1975, 4,425 commercial vessels entered the Bay. The U.S. Navy averages 27 ships docked in the Bay at any time and over 111,000 private pleasure craft are registered in the Bay Area. There are 137 harbors and marinas in the area with berthing space for 15,200 private vessels. The potential for sewage pollution from these vessels is large; however, problems have been identified only in certain areas. No problems have been reported for commercial vessels which have holding tanks and discharge at sea while the U.S. Navy will modernize all their vessels to treatment or on-board holding tanks by 1981. Private pleasure craft appear to cause the greatest problem at this time in localized areas such as marinas and relatively enclosed bays. Sources of bacterial pollution are difficult to trace but preliminary analysis indicates that vessel wastes have caused problems in Suisun Bay, Corte Madera Slough, Richardson Bay, San Rafael Bay and Redwood City Marina.

Private vessels with fixed toilet facilities are subject to new Federal regulations that require the installation of either holding tanks or flow-through treatment systems, but the Coast Guard has limited means to enforce the program. There is now a shortage of land based disposal facilities for emptying holding tanks. Flow-through devices have the potential for malfunction or misadjustment. Periodic monitoring of harbors' and marinas' water quality would better define the pollution problem and determine the effectiveness of flow-through devices, but lack of manpower and funds has prevented any agency from conducting such a program. The State Health Department has indicated that only holding tank type devices would provide reasonable protection to shellfish beds from vessel sewage discharges.

Solutions to the vessel waste pollution problems would include increasing the number of shoreside waste handling facilities and improving vessel inspection and water quality monitoring. If water quality monitoring results show a continuing problem, then certain parts of the Bay may need to be declared no-discharge zones.

Dredging

Dredging activities occur throughout San Francisco Bay and the Delta. Most dredging is for periodic maintenance of existing channels required by commercial, military and pleasure craft. Extensive studies have concluded that there is a short term degradation of water quality and destruction of benthic animal life in the immediate vicinity of dredging site. High current velocities in authorized dredge spoil disposal sites prevent buildup of mud that would smother benthic animals. Because the Bay has strong currents and naturally high suspended solids, dredged areas repopulate with new organisms within a few months and organisms outside the working areas do not seem to be adversely affected.

The principal problem with dredging is an unknown. What are the long term subtle effects upon living organisms in the Bay from the release of metals and organic pollutants tied to Bay sediments? No adverse effects are obvious but sufficient research on this problem has not been conducted. A better understanding of the Bay ecosystem is needed to tie together, in cause-and-effect relationships, various biological changes in the Bay such as the decline of the Dungeness crab or fish kills to specific activities of man such as dredging.

Mining

Mining activities in the Bay include mineral extraction of sand, gravel, crushed stone, oil, gas, geothermal steam, and Bay salt. Mercury and coal were also mined in the past. Federal and State laws regulate mining activities, including waste discharges. None of the mining activities that result in a water-borne pollutant discharge was determined to be a significant source of pollution in the region.

A new state law, the Surface Mining and Reclamation Act, has yet to be tested. In the absence of recent reports of unmitigated mining-caused pollution problems, the new Act should be given an opportunity to work and mining pollution reassessed at a future date.

Section-E

FINANCING AND MANAGING WATER POLLUTION CONTROL FACILITIES

This section describes the institutional context within which the plan must be implemented. Agencies with a role in water pollution control are described as are the means of financing construction and operation of facilities.

WATER POLLUTION CONTROL AGENCIES

Operating agencies

Operating agencies are those that own and operate water pollution control facilities. Cities and special districts typically own and operate municipal sewage collection, treatment and disposal facilities. Industrial wastewater facilities are owned and operated by the industries they serve. Individual home or boat owners operate septic tank systems and marine sanitation devices. The operating agencies for most surface runoff controls such as street sweeping are the cities and counties.

Regulatory agencies

Regulatory agencies ensure that the operating agencies perform their function in a satisfactory manner. The most prominent examples of regulatory agencies in the water pollution control field are the Regional Water Quality Control Boards. In accordance with the provisions of the Porter-Cologne Act and the Federal Water Pollution Control Act the Regional Boards issue discharge requirements for all point sources of water pollution. If a discharger violates its requirements then the Regional Board can impose various sanctions including fines.

Two Regional Boards have responsibility for parts of the EMP study area. The portion of the study area tributary to the Bay-Delta system, representing about 95 percent of the entire study area, is the responsibility of the San Francisco Bay Region Regional Water Quality Control Board. That portion of Santa Clara County that drains to the Pajaro River and ultimately Monterey Bay is the responsibility of the Central Coast Region, Regional Water Quality Control Board.

Regulation of non-point sources of pollutants is generally more complicated, often involving several different agencies. No agency is currently regulating surface runoff in a comprehensive manner although the Regional Water Quality Control Board has the authority to do so. Different aspects of septic tank systems are regulated by the Regional Water Quality Control Board and the County Health Departments. Operating and regulatory agencies responsible for different pollutant sources are shown in Table 4.

Designation of Management Agencies

The provisions of the Federal Water Pollution Control Act require that management agencies, that is, operating agencies, capable of putting into effect the recommendations of this plan be identified as part of the plan. This is particularly important because after the plan is approved only those agencies identified as management agencies will be eligible to receive federal grants.

TABLE 4

Operating and Regulatory Agencies

<u>Pollutant Source</u>	<u>Operating Agency</u>	<u>Regulatory Agency</u>
Municipal sewage	Cities and special districts	Regional Water Quality Control Boards, EPA
Industrial wastewater	Private companies	Regional Water Quality Control Boards, EPA; cities and special districts
On-lot disposal systems (incl. septic tanks)	Homeowners	County Health Departments Regional Water Quality Control Boards, City and County Building Departments
Vessel wastes	Ship and boat owners	U.S. Coast Guard, County Health Department State Health Department State Water Resources Control Board S.F. Bay Conservation and Development Commission Regional Water Quality Control Boards
Dredging	U.S. Army Corps of Engineers Private contractors	U.S. Army Corps of Engineers EPA U.S. Fish and Wildlife Service State Lands Commission S.F. Bay Conservation and Development Commission State Water Resources Control Board Regional Water Quality Control Boards
Mining activities	Mine operators/owners Local governments	EPA Regional Water Quality Control Boards Cities and Counties
Oil & Chemical Spills	Ship, truck and factory operators CALTRANS Private cleanup contractors Department of Fish and Game California Office of Emergency Services U.S. Coast Guard	United States Coast Guard Environmental Protection Agency U.S. Department of Transportation California Office of Emergency Services California Department of Fish and Game California Highway Patrol Regional Water Quality Control Board, S.F. Bay Region State Water Resources Control Board

Experience has shown that large operating agencies are usually better managed than smaller ones. Economies of scale are possible and larger operating budgets allow the employment of better qualified staff. In addition, the existence of large operating agencies could lead to consolidation of treatment facilities which may be desirable in the long run.

In most cases the plan recommendation tables included in Section F specify an agency that is responsible for taking the action necessary to implement each recommendation. In a few instances the agency designation is stated in general terms; the following paragraphs expand on certain designations.

Construction and operation of municipal wastewater facilities is the responsibility of cities and special districts. In most parts of the Bay Area, local agencies have formed subregional wastewater management agencies in order to build facilities that will serve several local agencies. Discussion with representatives of both local and subregional agencies led to the conclusion that where such subregional agencies exist they are the logical designated agencies; where they do not exist the local agencies should remain the designated management agencies. A local agency member of a subregional agency would not be precluded, however, from receiving a State or Federal grant for a project of only local interest provided it has the prior approval of the subregional agency.

The counties are the designated management agencies for surface runoff controls. As with municipal facilities, individual cities would not be precluded from receiving State and Federal grants for projects of only local interest provided the city has the approval of the county.

FINANCING WATER POLLUTION CONTROL FACILITIES

Municipal Facilities

Municipal wastewater facilities are the sewers, pipelines, treatment plants and outfalls required to safely dispose of wastewater from homes and businesses.

Grants are available from the State and Federal governments to help municipalities pay for construction of wastewater facilities. Until recently, and possibly in the future, the State and Federal governments will pay up to 12 1/2-percent and 75 percent of the cost of construction respectively. The local share of the construction cost together with the cost of operation and maintenance must be financed by user charges. User charges are fees charged homeowners and businesses for use of the sewer system. For commercial and industrial-users they are based on the volume and strength of the waste discharged to the system. Residential users often pay a connection charge and flat fee for service.

Industrial users of municipal systems are required to pay back that portion of the federal grant associated with the capital cost of the capacity they use.

Industrial Facilities

Industrial wastewater facilities are paid for by individual private companies. Tax laws allow industry to reduce its tax burden by granting tax credits for investment in pollution control and by allowing rapid depreciation of pollution control facilities. The Small Business Administration and California Pollution Control Financing Authority provide businesses with low-interest loans for pollution control equipment in certain cases.

Financing Problems

Few serious problems have been encountered in financing the present expansion of municipal and industrial wastewater treatment. With some exceptions cities and special districts have successfully sought voter approval for sale of bonds to finance the local share of municipal facilities costs. Few revenue programs which specify the user charges that are necessary to pay for the new facilities have come into effect, however. Most homeowners and businesses have yet to feel the full effect of increased costs for sewage disposal. Once these charges are in effect there may be a reduced voter readiness to approve new bond issues.

It is difficult to predict how much longer 87 1/2 percent grants for wastewater facilities construction will be available. Continuation of 12 1/2 percent state funding is dependent on statewide voter approval of a bond issue in 1978. The present federal 75 percent funding may be reduced as part of the amendments to the Federal Water Pollution Control Act being considered by Congress at the present time.

Section-F

PLAN RECOMMENDATIONS

The recommended water quality management plan consists of an overall water quality management strategy divided into five control elements or action plans. The overall strategy consists of a list of planning principles or policies that will guide water quality management actions in the future. This strategy ensures that effort and funds are expended on those controls that result in the greatest environmental benefit at the least social and monetary cost. Within the five action plans, individual policies are accompanied by a set of implementing actions which describe how water quality in general should be managed and how municipal discharges, industrial discharges, surface runoff and a number of miscellaneous sources of pollutants can be controlled.

Table 5 lists the plan recommendations. The policies that comprise the water quality management strategy and their implementing actions are listed in the first column headed recommendations. For each action subsequent columns of the table show the agencies responsible for implementing the action, implementation schedule, legal authority of agency to implement the action, cost, source of funding, measures to ensure implementation and the environmental, institutional/financial, economic and social impacts of the action. Whenever the Regional Water Quality Control Board is indicated as responsible agency, the recommendation applies to both the San Francisco Bay and Central Coastal Region Boards except for policies 1 and 3 that apply only to the Bay.

The purpose of the following narrative is to serve as an aid to understanding the contents of the table.

WATER QUALITY MANAGEMENT ELEMENT

Policy 1. Improve understanding of the Bay-Delta estuarine system and the fate and effects of pollutants entering it.

When most pollution control actions were directed at the most obvious pollution problems, understanding of the bay system was not an essential prerequisite to action. Now that the more subtle or insidious effects are to be tackled, a good understanding of the bay system is imperative. This is of particular importance with regard to the need or otherwise for programs of strict surface runoff controls and pretreatment of industrial wastes discharged to the municipal sewer.

Actions

The establishment of a San Francisco Bay Delta Research Advisory Council is recommended. The Council would have the primary objective of improving the gathering and coordination of water quality data needed to improve understanding of the bay-delta system. The Council would act in an advisory capacity to State and local agencies and other members of the Council.

Although millions of dollars are spent each year on monitoring the bay by numerous organizations, there is no established procedure for coordinating monitoring programs or translating monitoring results into action. At the present time dischargers are required to conduct self-monitoring programs to measure the performance of their treatment plants and to monitor the response of the environment to their discharges. The recommended action would have current monitoring efforts evaluated by the State Water Resources Control Board, Regional Water Quality Control Board, and the Advisory Council. Topics for evaluation would include improved coordination of laboratory and field work presently being performed, possible establishment of a centralized monitoring and research organization, and the role of industrial dischargers in the monitoring programs. Results of this program will be used to establish dischargers' future monitoring requirements. The monitoring programs can be designed as an integrated whole and effort can be focused more readily on those areas or problems of most concern, with improved accuracy and credibility for revising water quality objectives.

Actions are also recommended to improve the management of data gathered and make it more accessible to concerned citizens or other users. Annual reports will be prepared, summarizing research and monitoring results, which will serve as an input to the plan updating process.

Policy 2. Establish continuing planning process for water quality management.

(This Policy and associated Actions were moved to the Continuing Planning Process by the Environmental Management Task Force. The descriptive text is retained here for continuity of the water quality management plan presentation. Tabulation of Policy 2 is presented in the Continuing Planning Process Section.)

The water quality objectives for the region are the keystone of water quality management. They are not unchanging, however. Changes may be necessary for several reasons. New information on the effects of pollutants on the waters of the region may allow the existing objectives to be refined or may require that new objectives be added to protect against presently unforeseen threats to water quality. It may be necessary to revise the objectives to make them consistent with other regional goals. Likewise it may be necessary to modify the existing implementation plan to meet the changed objectives.

Actions

The adoption by EMTF of water quality objectives for the region and certain other portions of the existing water quality control or basin plan is recommended as a first step toward establishing the continuing planning process for water quality. This action together with the Regional Water Quality Control Board's adoption of this plan will make this plan the single guiding instrument for water quality management. The water quality objectives and the beneficial uses they are designed to protect are included in their entirety in Section H. They are identical to those presently adopted by the Regional Board.

It is recommended that the State Water Resources Control Board establish an interim standard for delta outflow that will ensure that sufficient winter time flood flows enter the bay. Once established the interim standard would be adopted by the ABAG Regional Planning Committee and the Regional Water Quality Control Board as part of this water quality management plan.

Updating of the plan at annual intervals is recommended. Plan revisions will be prepared by ABAG and Regional Water Quality Control Board staff. Between formal plan updates interim changes can be based on Regional Board and ABAG Regional Planning Committee approval only. It is recommended that a memorandum of agreement be signed by ABAG and the Regional Board defining the plan update procedures and the role of each organization.

Policy 3. Facilitate the reestablishment of recreational and commercial shellfish harvesting in San Francisco Bay as allowed by water quality.

One of the major benefits of cleaning up San Francisco Bay could be the reestablishment of recreational and commercial shellfishing. Actions designed to reduce pollutant emissions to surface waters that might contaminate shellfish are included under other policies. The necessary administrative and regulatory actions are described here.

Actions

It is recommended that the State Department of Health conduct a sanitary survey of shellfish beds in the bay at an early date. Apparently safe beds could be opened for recreational harvesting subject to continual State and local health department monitoring. An agreement between the State Department of Health and the State Department of Fish and Game is recommended that would define the arrangements for patrolling unapproved beds. It is recommended that the Department of Health establish criteria for the type and number of pilot studies necessary prior to permitting commercial harvesting.

Policy 4. Ensure that water pollution control facilities or measures effectively protect water quality.

When the present program of treatment plant construction is completed, the emphasis in water quality management will shift from construction to operation.

If the investment in pollution control facilities or measures is to be worthwhile, they must do the job they were designed for. In addition, we must ensure that water quality is indeed protected.

Actions

The actions recommended to put this policy into effect are of two types; monitoring actions and information-sharing actions. As at present, the Regional Water Quality Control Board will require that municipal and industrial dischargers monitor the quality of their effluent. The actions necessary to ensure that surface runoff controls are effective are described in the individual county surface runoff plans.

The information-sharing action consists of the Regional Water Quality Control Board, with the assistance of local sewerage agencies, publishing an annual summary of the discharger self-monitoring reports.

MUNICIPAL FACILITIES ELEMENT

Policy 5. Provide facilities needed for municipal sewerage service and water quality protection.

Municipal wastewater facilities should be provided to dispose of wastewater from homes and businesses without posing a threat to public health, welfare or the environment. Facilities should be sized to serve that level of growth consistent with regional goals.

Actions

The construction of new or the expansion of existing wastewater facilities necessary to further the above policy is recommended. The facilities needed over the next 20 years are shown in Section J. The treatment levels required before discharge are the same as those currently required by State and Federal law; these levels of treatment adequately protect the receiving waters. Discharges will continue to be regulated using the National Pollutant Discharge Elimination System (NPDES) or permit program administered by the Regional Water Quality Control Board.

Every year the twenty-year list of needed facilities will be updated by ABAG and the Regional Water Quality Control Board in consultation with the dischargers. (This action is included with the Continuing Planning Process.)

An undetermined percentage of the capital cost of facility construction will be supported by State and Federal grants.

Policy 6. Encourage consolidation of treatment facilities and discharge of wastewater to well-mixed areas of the receiving waters.

Most of the decisions affecting the consolidation of treatment facilities and the location of discharge sites have been made. A major factor in these earlier decisions was the desire of the sewerage agencies to maximize the use of existing facilities. As facilities wear out and need to be replaced or modified the earlier decisions must be re-examined. Opportunities to move discharges to less environmentally sensitive areas and to consolidate treatment should be taken where this is environmentally desirable and economically justified. Consolidation of treatment facilities can save money and usually leads to better operational reliability. This policy is not a mandate for any particular projects.

Action

All plans for proposed new facilities or facilities modifications will be reviewed for consistency with the above policy. Projects determined to be inconsistent will not be included on the twenty-year project list and thus will not be eligible for State and Federal grants.

Policy 7. Accelerate progress toward wastewater reclamation and reuse.

Actions to implement this policy are described in the Water Supply Management Plan.

SURFACE RUNOFF ELEMENT

Policy 8. Establish a program of surface runoff controls that emphasizes low-cost measures to reduce the pollutant load from this source.

As discussed previously evidence exists that surface runoff may be contributing significantly to the regions' remaining water quality problems. Because the evidence is inconclusive, a major investment in surface runoff controls is not justified at this time. However a minimal level of control requiring little investment of funds and representing no more than good urban "housekeeping" (best management practices) is recommended. The actions needed to further this policy are contained in the individual county surface runoff plans included in an appendix. A summary description is included below.

Actions

The main emphasis in the county plans is on development of control measures to reduce the accumulation of pollutants prior to runoff, establishment of education programs and monitoring to better define runoff-related water quality problems and the effectiveness of controls. The most common recommended actions include:

- improve street sweeping. Includes revision of street sweeping schedules to concentrate effort just before and during the rainy season. Other techniques include instituting parking regulations to allow sweepers access to curb area, training street sweeper operators to increase pick-up of fine particles (which contain a high percentage of pollutants), and further studying existing street sweeping practices for future modifications as part of the continuing planning process.
- control use of certain chemicals. Recommendations range from regulating pesticide usage to educating home users of chemicals.
- clean stormwater collection system. This control measure includes recommendations ranging from improving cleaning of catch basins and storm drains to cleaning open channels.
- control dumping. Recommendations include oil recycling programs, enforcement of existing anti-dumping ordinances, drafting watercourse protection ordinances and neighborhood composting programs.

- develop anti-littering program. Recommendations include public information programs, placement of litter receptacles and strict enforcement of ordinances.
- control erosion. Recommendations include increasing enforcement of existing ordinances, drafting additional requirements where needed, stabilizing stream banks and requiring erosion control considerations in environmental impact reports and project review guidelines.
- establish water quality monitoring program. All counties saw the need to further sample water quality to better define existing problems and measure the effectiveness of control measures.
- establish public education/information program. It was concluded that the public generally lacks awareness of the relationship between polluting substances and their impact on water quality. All counties therefore suggested various forms of educational programs.
- establish procedures for continuing planning. Recommendations included establishing surface runoff coordinating bodies in the counties, documenting control measure practices and their effectiveness and making recommendations for annual revisions, and determining financing mechanisms for annual work programs.

Most counties see a need to undertake demonstration projects which will determine the cost and effectiveness of certain control measures. In addition most counties identified several tasks which would be best accomplished by ABAG and the Regional Water Quality Control Board at the regional level including:

- *Continued Management of the Surface Runoff Program:* The plan recommends that the present structure of the Surface Runoff Management Program be maintained. In the face of this program's complexity, the continuation of the existing structure will facilitate communication between Federal, State and local agencies as they implement the plans.
- *Coordination of Data Gathering:* The plan recommends that ABAG coordinate the gathering of baseline data for problem identification. In the plan development process it was recognized that water quality and quantity data are collected by many organizations.

Currently, much data collection proceeds without the clear understanding of what information is required for management-level decisions. SFBDRP could assist in coordinating data gathering and storage, analysis and dissemination. This will reduce duplication of effort, provide central data storage, and make the data readily available.

- *Technical Information Exchange:* Water quality data is not the only type of information which is required for water quality management. Other information includes cost and effectiveness of control measures. The plan recommends that ABAG collect and disseminate this technical information for the counties in the continuing planning process.
- *Preparation of Model Ordinances:* This plan recommends that ABAG assist the counties in developing model ordinances for control of surface runoff-related problems. Specific model ordinances which have been requested by the counties are: erosion control, range management, performance standards for sensitive lands, streambank protection, litter ordinances and recycling controls.
- *Educational Programs:* The counties recognize that a public education program regarding surface runoff pollution and its sources would be desirable. To avoid duplication of effort, it was felt that a regional approach would be appropriate. Specific educational proposals include multi-media presentations and elementary and secondary education curricula.

The following paragraphs summarize each county plan.

Alameda -- The intent of Alameda County's plan is to organize the collective efforts within the county to reach balanced solutions to its pollution problem. Surface water quality investigations conducted by the county since 1972 and the recent 208 investigations of urban storm-water runoff have verified the existence of substantial and widespread pollution of local interior waters.

To establish a process to manage these sources, recommend Best Management Practices (BMP's, i.e., non-structural source control measures) include: education programs, street cleaning, drainage system cleaning,

litter and oil control and revisions of existing erosion control ordinances. In general, these BMP's are existing activities augmented by improvements of existing hygiene services. On agricultural lands, additional investigations with the agriculture agencies are recommended (by the Corps of Engineers) to develop land management plans to investigate erosion problems.

Documentation of existing service levels indicates that surface runoff control expenditures annually exceed \$4.7 million. Indications suggest that there is an interrelation between expenditure levels and effectiveness of surface runoff controls. The plan notes that these existing service levels are likely to be cutback due to budgetary pressures. However, the maintenance of existing service levels or even existing budget levels is strongly recommended.

Contra Costa -- This plan points out that many existing projects, programs, ordinances and regulations may be better designed to protect the quality of surface waters and the capacity of reservoirs in the county. The purpose of the control measures selected for implementation is to incorporate water quality considerations into the decision-making process to a greater extent than in the past. This will be accomplished by inclusion of water quality considerations in environmental impact review processes, design review guidelines and conditions of approval for construction projects, and as a guideline for selection of alternative plans for flood control and drainage work, road design, and other public projects, including maintenance programs. This will result in a higher level of awareness of the water quality implications of governmental actions. The need for public awareness will be met through a region-wide public education program.

Marin -- The Marin County plan notes the high level of effort already expended by cities, special districts and the county on surface runoff pollution control. The plan recommendations for initial implementation are directed more towards bringing about uniform application and increased efficiency of existing measures rather than creating new programs. The Marin County plan recommends:

- o The continuation and possible improvement of existing drainage system cleaning programs
- o The concentration of street sweeping efforts in highly contaminated areas and the establishment of sweeper schedule related parking restrictions
- o Greater emphasis on compliance with and enforcement of erosion control requirements at construction sites

In addition, the Plan recommends certain preventive measures such as a public information program and the adoption of strict runoff standards for all new developments within domestic water supply watersheds.

Napa -- Napa County's Plan calls for continuation of ongoing water quality sampling programs such as the existing Baseline Study, with added goals to include locating boron sources in the Calistoga area. A special sampling program will seek the sources of high coliform counts in Conn Creek. The county, cities and the Resource Conservation District will review existing practices for low or no cost opportunities to reduce pollutants. Examples include temporary sediment traps at construction sites, rescheduled street sweeping for fall leaf pickup and pasture management to reduce overgrazing. The existing practice of notifying property owners to remove illegally dumped refuse from watercourses will be reviewed for effectiveness, and additional controls will be implemented if necessary.

San Francisco -- Unlike other communities in the Bay Area the City and County of San Francisco has a combined sewer system which collects both sanitary waste and approximately 95-percent of surface runoff. During periods of rainfall flows exceed the capacity of the system; untreated wastewater overflows into natural channels and the bay at 39 locations around the periphery of the city. Overflows occur an average of 82 times a year. The adverse effects of overflows on beaches and receiving waters persist for about one-third of the year.

In response to Regional Water Quality Control Board requirements the city has developed a wastewater management master plan which will make untreated wastewater overflows a rare occurrence. The master plan concept is one of an integrated and balanced system of treatment, storage/transport and pumping facilities. The design is complete for an expanded treatment plant on the Bay side of the city to provide for secondary treatment of dry weather flows. Construction contracts are being advertised in late 1977 and early 1978. The construction of the system to transport dry weather flow from the northeast area of the city to the new southeast plant is nearly completed. Facility planning is underway for a new secondary plant to treat all dry weather flows from the west side of the city. Included in this investigation is the planning for wet weather treatment facilities as well as an investigation of the requirements and potential for wastewater reclamation. A system of transport/storage structures will collect and store surface runoff together with domestic wastes until treatment can be provided at treatment plants. Contracts have been awarded for six major wet weather transport/storage and pumping facilities for the west side of the city. A new deep water outfall is under design and facility planning for the remainder of the west side facility is under way.

When the plan is fully implemented surface runoff will be treated and discharged to the ocean through long submarine outfall.

San Mateo -- The San Mateo County Surface Runoff Management Plan was prepared under the policy guidance of local cities, districts and citizens. The study concluded surface water runoff is not a major problem for water quality in this county. Most of the waters in the County are in good condition due to wise watershed planning, massive sewage discharge cleanup, and other existing public works and planning services.

The study did find, however, that surface runoff can carry materials into our waters which are either unattractive or not particularly good for our waters or the life they support. But while the possible sources of water

pollution are widespread, specific water quality problems were harder to identify and seem to occur in small or isolated locations. Importantly, the sources of runoff pollution also contribute to other problems which are already costing the County for cleanup or abatement services. These problems include aesthetic degradation, inadequate drainage and flooding, and habitats for mosquitoes and rats.

The plan for this county outlines a low-cost five year program to help reduce some of the sources of these problems, particularly in areas draining to known water quality trouble spots. It stresses public education and prevention, but it also emphasizes working toward more efficient use of present cleanup equipment and existing services and controls. These improvements will be developed from the suggestions of local jurisdictions working together to identify and solve local problems.

Santa Clara - The primary thrust of the county surface runoff plan is to continue existing surface runoff control activities. Over \$4.5 million is currently being spent on various programs which mitigate surface runoff pollution, but which have other benefits as their main purpose. These programs will be coordinated to help improve water quality and reduce future pollution.

Within developed areas, street sweeping, storm drain cleaning, and litter control programs are designed to reduce litter and debris problems. Street sweeping also helps to reduce accumulation of heavy metals, such as lead from auto exhaust. Increased efforts to prevent dumping of used oil into storm drains center on public education programs and on establishing and expanding used oil recycling stations.

In both the developed and undeveloped areas of the county, erosion and siltation problems are the major concerns which need to be evaluated further. These problems are to be addressed through the adoption of erosion control ordinances and through preparation of land management plans by local Resource Conservation Districts.

The exact nature and magnitude of most surface runoff problems is still largely unknown. The lack of rainfall, together with other factors, have made it difficult to assess the severity of existing problems. The draft plan supports continued effort to determine more precisely the nature and magnitude of surface runoff pollution problems. Included in this effort is a request for funds to evaluate the changes in quality of surface runoff when detained for various periods in the Palo Alto flood basin.

Finally, the plan recognizes the need for an ongoing local effort to evaluate, update, monitor and improve local implementation. A process is initiated to designate an appropriate local agency as the "surface runoff management coordination agency for Santa Clara County."

Sonoma -- The (1978-1980) initial phase of the Sonoma County plan provides for initiation of practices which would reduce potential and suspected surface runoff problems. The plan includes creation of a Surface Runoff Quality Committee to coordinate education programs regarding polluting materials and preventive actions, to promote interagency cooperation and to disseminate information through areawide mailings and media releases.

Adoption of erosion control, drainage, and litter ordinances are called for in the initial period. Regional assistance from ABAG with education programs and from SFBDRP with surface water quality monitoring is recommended. State and/or Federal funding assistance is recommended for regional activities or where local funds are not available.

If needed, the (1980-1983) continuing planning period specifies actions which would be more costly and would be instituted only if the required level of surface runoff water quality is not achieved by the initial planning period actions.

Solano -- The draft Solano County plan proposes several control measures and programs. These proposals include: the creation of a 208 Surface Runoff Control Office within existing county departments to implement the plan, improved street sweeping activities through updated techniques and a possible monitoring program, a public education program to explain methods used to prevent pollution from home application of pesticides and fertilizers, investigation of an oil recycling program to provide a way for citizens to dispose of used oil, continuation of the current five-year septic tank inspection program, updating or drafting erosion control ordinances for the county and cities, and the encouragement of best use practices for agricultural activities and the adoption of a creekside ordinance to further control erosion and siltation.

These measures will be implemented over a six-year period with most effort occurring in the first two. The County, local affected cities, special districts and other agencies will be responsible for carrying out the plan control measures and programs in coordination with the County 208 Planning Agency and affected regional agencies.

INDUSTRIAL FACILITIES ELEMENT

Policy 9. Provide facilities needed for industrial wastewater treatment and water quality protection.

Industrial wastewater facilities should be provided to dispose of wastewater from industries without posing a threat to public health or welfare, the environment, or in the case of indirect dischargers, to the municipal sewerage system.

Actions

The construction of new or expanded industrial wastewater facilities necessary to further the above policy is recommended. A list of direct industrial dischargers and discussion of the treatment levels they must attain is included in Section K. The treatment levels required before direct discharge to the environment are the same as those currently required by State and Federal law; these levels of treatment adequately protect the receiving waters. Direct discharges will continue to be regulated using the National Pollutant Discharge Elimination System (NPDES) permit program administered by the Regional Water Quality Control Board.

The cost of facilities will be borne by private companies. Low interest rate loans for the cost of construction of pollution control facilities are available to industry under certain circumstances.

Industrial dischargers to municipal wastewater systems will be required to pretreat their waste to that degree necessary to allow the municipal plant to meet its discharge requirements, to prevent interference with the treatment processes, and to allow the agricultural use of sewage sludge. Sewerage agencies will be responsible for administering the necessary pretreatment or source control programs. It should be noted that federal regulations on pretreatment are expected to be finalized later this year. Depending on the nature of the regulations the plan may have to be adjusted.

MISCELLANEOUS SOURCES ELEMENT

Policy 10. Reduce sewage pollution from vessels including houseboats in the Bay-Delta system.

The discharge of raw or poorly treated sewage from small boats causes violations of water quality standards in marinas and harbors. The effects of vessel discharges in open waters are too slight to be detected. However, sewage from vessels can contaminate shellfish beds, which is one reason why commercial shellfish harvesting is not permitted in San Francisco Bay.

Actions

Pollution caused by vessels does not appear to be one of the regions more serious environmental problems. Consequently, the main thrust of the recommended actions is enforcement of existing or slightly amended regulations and public education rather than drafting of new regulations. If in the future, these actions fail to solve the problem, or if information developed in public hearings shows the problem to be more serious than presently supposed, then it may be necessary to take stronger action such as prohibiting any vessel discharges in certain parts of the bay.

The construction of holding tank pump-out facilities at all marinas and harbors is recommended. A public information program should be initiated to increase boat owners' awareness of problems caused by vessel discharges and the devices available for solving the problem. Boat owners installing flow-through waste treatment type devices should be made aware that possible future regulations could require their replacement with more reliable holding tank devices. Water quality monitoring in areas frequented by small boats should be intensified in order to determine the effectiveness of control measures. Although no water quality problems associated with commercial vessels have been identified to date, the monitoring program will be designed to identify such problems if they do, in fact, exist.

Policy 11. Improve wastewater disposal practices in unsewered areas consistent with regionwide development policies.

For many years, the trend has been away from on-lot disposal systems such as septic tanks. In general, this has been a favorable trend because,

in most cases, community-owned sewage collection, treatment and disposal facilities provide a safer and more reliable alternative to on-lot systems. Exceptions to this general rule may exist in the more rural parts of the region. The purpose of the policy is to ensure that where on-lot systems are determined to be the most appropriate waste disposal system, they are designed, constructed and maintained in a manner that protects the public health and water quality.

Actions

It is recommended that: the Regional Water Quality Control Board, in conjunction with County Health Departments, establish minimum, region-wide guidelines for the selection, evaluation, design and construction of on-site disposal systems, incorporating the latest scientific information on the subject. Local city and county governments would incorporate these guidelines with appropriate modifications for local conditions into their building codes. Those counties which incorporate such standards would be exempt from RWQCB Waste Discharge requirements for the individual on-site systems.

For new housing developments which could use on-site disposal systems (where those systems are technically appropriate), public management of those systems would be required. For existing housing developments having sewerage problems which could be eliminated by proper maintenance of on-site systems, public management would be a permitted option. Public management could be by existing agencies or new and could perform a range of tasks including monitoring, service and repair or could contract some services to private companies. Public management eliminates only maintenance-related failures and does not advocate inappropriate location of on-site disposal systems. Where on-site systems are technically or economically inappropriate or do not conform to local land use plan requirements, then sewerage systems should be installed.

The California Health and Safety Code, Section 6950, amended in 1977, provides for the inspection and maintenance of existing on-site systems.

In recognition of the desirability of the proposed actions developed for the EMP, the RWQCB on 19 August, 1977 issued proposed policy statements that would lead to the adoption of updated design criteria and public maintenance of new-on-site disposal systems.

Policy 12. Monitor effectiveness of existing arrangements for preventing and cleaning up oil and chemical spills.

Responsibility for prevention and clean-up of oil and chemical spills is shared by many agencies. Each agency deals with a part of the problem. Because of the division of responsibility it is difficult for policy makers and the public at large to determine whether present practices are effective.

Actions

Recently (March, 1978) the Federal government published new regulations dealing with spills of hazardous substances. The regulations define the substances and quantities considered to be hazardous and establish penalties for spills. It may be that once these new regulations are implemented the frequency of occurrence of spills will be reduced. The plan recommends monitoring the implementation and effectiveness of the new regulations. After at least one year of monitoring implementation of the new regulations

two further actions are recommended. A task force should be established at the State level to assess the existing arrangements for prevention and clean-up of non-petrochemical spills to offshore waters. In addition, a study of the arrangements for clean-up of inland spills, for example as a result of road tanker accidents, should be undertaken.

Another action recommends the U.S. Coast Guard restudy the possibility of extending high-resolution radar coverage north of the Richmond-San Rafael Bridge as a way of further reducing the possibility of tanker accidents.

The enactment of Federal laws requiring improvements in the standard of construction for tankers is also recommended.

TABLE 5

**Water Quality
Management Plan**

recommendations

Water Quality Management Plan recommendations

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL * COST/YEAR OF RECOMMENDED ACTION	PORTION OF * TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 1 IMPROVE UNDERSTANDING OF BAY-DELTA ESTUARINE SYSTEM AND THE FATE AND EFFECTS OF POLLUTANTS ENTERING IT								
<div> * This column presents annualized costs. The annualized cost is the amount of money per year that would amortize the total cost of the program over the period 1978-2000 at a 6-3/8% interest rate. </div>								
Action 1.1 Establish San Francisco Bay Delta Research Advisory Council.	Further definition of pollution cause and effect relationships is needed as a basis for developing better standards for protection of water quality. The Council will include representatives from the Regional Water Quality Control Board, the State Water Resources Control Board, ABAG, BCDC and Delta Advisory Council, county surface runoff lead agencies, discharging agencies, agencies involved in water quality research and experts in the various aspects of	RWQCB water quality research and monitoring and public and private interest groups. Staff support for the Council will be provided by RWQCB and SWRCB.	August, 1978.	Porter-Cologne Act	\$30,000	\$30,000		Voluntary membership and State and Regional Board action.
Action 1.2 Conduct receiving water monitoring program for San Francisco Bay.	This two-year program was designed by the San Francisco Bay Advisory Committee under the direction of SWRCB and RWQCB. The results of the program will be used to shape dischargers monitoring requirements including pretreatment in the future. The program should evaluate the need for a permanent centralized monitoring and research organization after fully exploring coordination of laboratory and field work presently performed by dischargers.	RWQCB/ SWRCB/ SFBDRAC	June, 1978	Porter-Cologne Act	\$1 million each year for 2 years	0	Federal "201" funds, State and local funds	RWQCB and SWRCB action
Caltrans = California Department of Transportation; ABAG = Association of Bay Area Governments EPA = Environmental Protection Agency;								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> o No impacts.	<u>Financial</u> o Costs would be met by participants; dischargers, counties, RWQCB, SWRCB, and EPA.	<u>Consumer Expenditures</u> o No impact	<u>Housing Supply</u> o No impacts.
<u>Water Quality</u> o Would improve water quality indirectly - provides data to make informed decisions.	<u>Institutional</u> o May result in higher level of cooperation among agencies and dischargers		<u>Physical Mobility</u> o No impacts.
<u>Physical Resources</u> o Would benefit physical resources indirectly as water quality is improved, e.g., the aquatic community, flora, fauna and recreation.	o May improve accuracy and credibility of research and monitoring results.		<u>Health and Safety</u> o Might uncover health and safety problems as a result of research or monitoring
<u>Energy</u> o No impacts.			o Would affect decisions on water quality that affect public health.
<u>Amenities</u> o Would affect amenities indirectly; highly dependent on nature of actions taken as a result of monitoring data.			<u>Sense of Community</u> o No impact.
			<u>Urban Patterns</u> o No impact.
			<u>Equity</u> o No impact.
<div>*IMPACTS NOTED FOR THE POLICY ARE COMMON TO ALL ACTIONS</div>			

Impacts same as noted for Policy 1.	<u>Financial</u> Direct Public Cost of implementation o \$30,000 per year Other institutional impacts are the same as noted for Policy 1.	Impacts same as noted for Policy 1.	Impacts same as noted for Policy 1.
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Impacts same as noted for Policy 1.	<u>Financial</u> Direct Public Cost of Implementation o \$1,000,00/year for two years Other institutional impacts are the same as noted for Policy 1	Impacts same as noted for Policy 1.	Impacts same as noted for Policy 1.
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SWRCB = State Water Resources Control Board

RWQCB = Regional Water Quality Control Board

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 1.3 Evaluate and establish research goals.		SWRCB and RWQCB advised by SFBDRAC	December, 1979 and annually thereafter.		\$15,000	\$15,000	Federal 208 or State program funds.	RWQCB AND SWRCB action
Action 1.4 Disseminate through the media and other sources an annual "State of the Waters" report.	A summary of current state of bay and delta waters.	RWQCB advised by SFBDRAC	August, 1979 and annually thereafter.		\$20,000	\$20,000	State program funds	
Action 1.5 Integrate water quality data with existing regionwide data management system.		RWQCB in cooperation with ABAG	Start by December, 1978.		\$19,000	\$19,000	State and EPA grants	

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 1.	Impacts same as noted for Action 1.1	Impacts same as noted for Policy 1.	Impacts same as noted for Policy 1.
Impacts same as noted for Policy 1.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o (1979-2000) \$20,000/year (labor and materials for report production and data compilation) <u>Institutional</u> <ul style="list-style-type: none"> o Would provide means of providing monitoring program results to the public. o Would provide foundation of public support for regulatory actions. 	Impacts same as noted for Policy 1.	Impacts same as noted for Policy 1.
Impacts same as noted for Policy 1.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o (1980-2000) \$2,000,000/year (estimate of total Bay Area monitoring costs). o Costs to be borne by fees from dischargers. Other institutional impacts are the same as noted for Policy 1.	Impacts same as noted for Policy 1.	Impacts same as noted for Policy 1.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 2

ESTABLISH CONTINUING PLANNING PROCESS FOR WATER QUALITY MANAGEMENT.

(Actions appear in Continuing Planning Process Tables.)

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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The Continuing Planning Process in and of itself would not have impacts. The monitoring and research results, and assessment of the impacts and effectiveness as policies and actions of the Water Quality Management recommendations are carried out, would provide the basis for future decisions. The potential impacts of carrying out the Continuing Planning Process recommendations would be similar to those identified for this initial phase of management planning.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 3

FACILITATE THE RE-ESTABLISHMENT OF RECREATIONAL AND COMMERCIAL SHELLFISH HARVESTING IN THE BAY AS ALLOWED BY WATER QUALITY

Billions of dollars have already been committed for improvements to sewage and industrial waste disposal systems to meet State and Federal requirements. Relatively modest additional expenditures on administrative and regulatory actions could re-establish recreational and commercial shellfishing.

Action 3.1 Conduct a preliminary survey and assessment of shellfish beds in the Bay.	Major shellfish beds suitable for recreational harvesting would be identified and assessed. The types and sources of contaminants affecting these beds would also be identified.	RWQCB, State Dept. of Health, Dept. of Fish and Game	Feb. '78		\$50,000	\$50,000	EPA and/or State grants	
Action 3.2 Establish a systematic monitoring and sampling program of selected shellfish beds.	Based on findings from 3.1 a selected number of shellfish beds would be monitored and sampled for bacterial contamination over at least a 12-month period.	RWQCB, State Dept. of Health and county health departments.	June '78		\$200,000	\$200,000	Federal grants, State funds from shellfish harvesting license fees	

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No direct impacts. <u>Water Quality</u> <ul style="list-style-type: none"> o May provide basis for improving water quality. o Would provide data for making informed decisions. <u>Physical Resources</u> <ul style="list-style-type: none"> o Would permit use of a valuable and renewable resource. <u>Energy</u> <ul style="list-style-type: none"> o No direct impacts. <u>Amenities</u> <ul style="list-style-type: none"> o Would provide an additional recreational source that is inexpensive and convenient for Bay Area residents. o Would provide Bay Area residents with high quality and fresh shellfish in restaurants and markets. 	<u>Financial</u> <ul style="list-style-type: none"> o Program would require personnel and operating funds. o Cost would be met by Federal, State and private sources. <u>Institutional</u> <ul style="list-style-type: none"> o Would require the cooperation of State and local agencies such as Departments of Health & Fish and Game, County Health Depts. and RWQCB. o May require additional staff resources to survey, monitor and patrol shellfish beds and establish criteria for commercial shellfishing. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Would provide employment for approximately 5 persons in government agencies. o Would provide employment for an unestimated number of persons engaged in the shellfish industry. o Would provide a fresh and high quality product for restaurants and markets. <u>Income and Investment</u> <ul style="list-style-type: none"> o Initial capital investment by private firms that want to establish a shellfish industry. o Initial investment of governmental funds to facilitate the establishment of shellfishing. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o A small license fee for recreational shellfishing. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impact. <u>Physical Mobility</u> <ul style="list-style-type: none"> o Would provide a unique source of local recreation without having to travel out of the region. <u>Health and Safety</u> <ul style="list-style-type: none"> o If properly monitored and controlled, it would reduce risks of people getting ill from eating shellfish they harvested themselves. There is little or no control at present. o Would also reduce the illegal marketing of shellfish caught in the Bay if depuration/relaying facilities enable commercial interests to produce a safe product. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impact. <u>Urban Patterns</u> <ul style="list-style-type: none"> o May encourage better public access to tidal lands and flats around the Bay. <u>Equity</u> <ul style="list-style-type: none"> o Impacts on special population groups (low and moderate income, minorities, etc.) depends on recipients of employment opportunities.
Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3
Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 3.3 Establish an agreement between State Dept. of Health and Dept. of Fish and Game for patrolling shellfish beds.	If findings from 3.2 indicate recreational shellfish harvesting is safe, then the Department of Fish and Game would have to patrol the beds, keeping people off unapproved and conditionally approved beds while allowing harvesting in approved beds.	State Dept. of Fish and Game, State Dept. of Health			\$100,000	\$100,000	State funds from shellfish harvesting license fees.	
Action 3.4 Establish criteria for commercial shellfishing in the bay and evaluate methods of harvesting.	The State Department of Health would establish the type and extent of pilot studies and routine monitoring required as prerequisites to any approval of commercial shellfishing in the Bay.	State Dept. of Health.	August '78		To be determined	To be determined	State financing to augment Health Dept. budget	

Policy 4

ENSURE THAT WATER POLLUTION FACILITIES OR MEASURES EFFECTIVELY PROTECT WATER QUALITY.

Action 4.1

Issue and update monitoring requirements appropriate to permit conditions and in conformance with region-wide monitoring network.

As the program of treatment plant construction winds down the emphasis in water pollution control will shift from construction to operation and monitoring.

RWQCB.

Continuous. Porter-Cologne Act.

\$160,000

-0-

State appropriation. EPA review.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3
Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3	Impacts same as noted for Policy 3
<u>Air Quality</u> <ul style="list-style-type: none"> o No impact. <u>Water Quality</u> <ul style="list-style-type: none"> o Would maintain receiving water quality by ensuring highest possible quality of treatment plant discharge. <u>Physical Resources</u> <ul style="list-style-type: none"> o Would benefit aquatic resources as an indirect result of improved water quality. <u>Energy</u> <ul style="list-style-type: none"> o No impacts. <u>Amenities</u> <ul style="list-style-type: none"> o No impacts. 	<u>Financial</u> <ul style="list-style-type: none"> o Refer to actions below. <u>Institutional</u> <ul style="list-style-type: none"> o Would ensure that sewerage service agencies are protecting water quality. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Minor employment increase. o Would ensure that industries are protecting water quality. <u>Income and Investment</u> <ul style="list-style-type: none"> o Wages would be paid to persons implementing this policy. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Refer to actions below. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impact. <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impact. <u>Health and Safety</u> <ul style="list-style-type: none"> o Would assure protection of public health through proper operation and performance of facilities <u>Sense of Community</u> <ul style="list-style-type: none"> o No impact. <u>Urban Patterns</u> <ul style="list-style-type: none"> o No impact. <u>Equity</u> <ul style="list-style-type: none"> o No impact.
Impacts same as noted for Policy 4.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o (1978-2000) \$160,000/year (personel costs for setting monitoring requirements). Other institutional impacts are the same as noted for Policy 4.	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Minor employment increase for agency. <u>Income and Investment</u> <ul style="list-style-type: none"> o Same as Policy 4. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impact. 	Impacts same as noted for Policy 4.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 4.2 Monitor performance of municipal and industrial wastewater systems in accordance with monitoring requirements.		Sewerage agencies and individual private companies.	Continuous.		Undetermined	-0-	Local and private funds.	RWQCB review.
Action 4.3 Publish annual report summarizing results of dischargers self-monitoring programs.		RWQCB and local agencies.	Annually.		\$32,000	\$32,000	State	

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 4.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o (1978-2000) \$182,700/year (cost to RWQCB for monitoring program). o Unknown costs for agencies. o Direct costs of laboratory and sampling equipment to be borne by discharger. o Costs would depend on specific monitoring requirements. o Personnel costs to be incurred by dischargers. Other institutional impacts are the same as noted for Policy 4.	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment increase for dischargers--minor per discharger. <u>Income and Investment</u> <ul style="list-style-type: none"> o Dischargers would pay wages to samplers and laboratory personnel. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o User charges may be increased to offset any increase in public service agency monitoring costs. o Prices of goods and services may increase if industries' monitoring costs are passed on to consumers. Direct Private Cost of Implementation <ul style="list-style-type: none"> o Costs to private industry cannot be estimated. 	Impacts same as noted for Policy 4.
<u>Water Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Physical Resources</u> <ul style="list-style-type: none"> o No impacts. Other environmental impacts are the same as noted for Policy 4.	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o (1979-2000) \$35,000/year (labor and materials for report production). <u>Institutional</u> <ul style="list-style-type: none"> o Would provide means of disseminating monitoring program results. o Would provide mechanism of communication with public. Other institutional impacts are the same as noted for Policy 4.	Impacts same as noted for Action 4.1	<u>Health and Safety</u> <ul style="list-style-type: none"> o No impact. Other social impacts are the same as noted for Policy 4.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 5

PROVIDE FACILITIES NEEDED FOR MUNICIPAL SEWERAGE SERVICE AND WATER QUALITY PROTECTION.

The 20-year project list in Section J of this chapter provides wastewater treatment facilities to serve a Bay Area population of 6.1 million in the year 2000. Inclusion on the list in Section J establishes that such projects may be eligible for future State and Federal assistance. Each such project would remain subject to the environmental impact reporting requirements of the National Environmental Policy Act and the California Environmental Quality Act, and would also be subject to review under the requirements of Office of Management and Budget Circular A-95 prior to State and Federal funding action. Therefore, inclusion on the list does not automatically constitute prior endorsement of the Association of Bay Area Governments and State and Federal funding agencies.

The 20-year project list will be updated annually as part of the continuing environmental management planning process. Future 20-year project lists may include changes in the timing of projects as additional information becomes available about population and employment growth trends in the region.

Growth and secondary effects of growth may have adverse impacts, particularly on air quality, as well as some positive impacts. So long as the capacities and timing of sewage treatment facilities on the 20-year project list are consistent with the Environmental Management Plan, the construction of wastewater facilities should accommodate growth planned for, but should not induce the kinds of impacts that could be attributed to construction of wastewater treatment facilities. Quantified estimates of impacts are expressed as ranges to indicate the differences under high and low population assumptions.

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o Temporary dust problems during facility construction.
- o Poorly designed or operated facilities may cause local odor problems.
- o Localized potential increases in carbon monoxide levels.

Water Quality

- o At minimum would result in removal of suspended solids, some toxicants, some nutrients, most bacteria and most oxygen demanding substances.
- o Treatment plants would provide high bacteria and virus removal, nutrient removal and/or reduction of toxicants and resistant organic compounds.
- o Growth accommodated would increase surface runoff by increasing the amount of impervious surfaces.
- o Reclaimed wastewater would increase supplies of water for agricultural, industrial, park and golf course irrigation.

Physical Resources

- o Water quality improvements benefit fish and wildlife resources.
- o Would increase sewage solids volumes and would require coordination with regional Wastewater Solids Study plan results.
- o Consumes construction materials (mineral resources).
- o Would result in disruptions of adjacent land uses and reduced supply of resources (e.g., agricultural lands).
- o Growth accommodated would consume between 190,000 and 250,000 acres of land by 2000 or 50-65% of land available for development.
- o May reduce wildlife habitats through encroachment or filling of marshes, mudflats.
- o May reduce the supply of land available for recreation uses.

Energy

- o Consumes electricity, gas and diesel fuel during construction.
- o Commits to energy use for treatment plant operation.
- o Advanced physical-chemical plants consume significant amounts of energy.
- o Could result in energy production benefits when co-combustion projects (sludge and refuse) are undertaken at the plant site.

Amenities

- o Facility construction, operation and design may have adverse visual, odor and noise effects.

Financial

Direct Public Cost of Implementation

- o Capital (20 year construction estimate) \$2.4 billion.

- o Operation and maintenance estimate \$122 million/year in 1995.

Fiscal Effects on Local Governments

- o Local governments and agencies would have to finance the local share of construction at a minimum of 12.5% of total costs or an estimated \$19 million (annualized) and all of \$71 million (annualized) operation and maintenance costs.
- o Specific fiscal effects depend on choice of financing mechanisms. Increased user charges, connection fees and property taxes in service areas would increase revenues of sewerage service agencies.
- o Indirect fiscal impacts would result from costs to provide public services (police, fire, etc.) to new development.

Institutional

- o Would require growth of existing agencies to provide expanded sewerage services.
- o Would require additional staff resources to provide public services to new development.
- o Would enable local governments to meet requirements of Federal and State standards.
- o Some projects may conflict with local general plans.

Production of Goods and Services

- o Employment - approximately 35,000 temporary and 700 permanent jobs would result from facility construction and operation.
- o Could permit influx of industrial/commercial businesses that would use municipal sewers.
- o In some cases would permit industry to stay rather than be closed by stringent direct discharge requirements.

Income and Investment

- o Indirect increase in plant operators and construction workers wages.
- o Facility construction will compete for funds on money markets.

Consumer Expenditures

- o Increased costs to consumers for connection to sewerage system.
- o Operation and maintenance costs are paid for by user charges.
- o Property taxes may increase in service areas to retire bonds issued to finance construction.

Housing Supply

- o Treatment facilities would accommodate approximately between 700,000 and 900,000 new housing units in the region by the year 2000.
- o Provision of sewerage service in unsewered areas could increase the supply and costs of housing in those areas.

Physical Mobility

- o Localized, short term disruptions in mobility may result during construction.
- o Congestion may result unless transportation improvements are made to serve development accommodated by improvements in wastewater facilities.

Health and Safety

- o Reduced health risks should result where discharges of poorly treated wastes are eliminated.
- o Indirect health benefits from water quality improvements.
- o Flood, subsidence, tsunami, landslide and seismic hazards may constrain the location, design and operational reliability of facilities.
- o Growth accommodated may affect local governments' effort to direct development away from hazardous areas.

Sense of Community

- o Character of neighborhoods and communities may change.
- o Provision of sewerage services in rural areas tends to change the character of rural communities to urban/suburban.

Urban Patterns

- o Collection systems in unsewered areas outside of urban service areas may be in conflict with local general plans.

Equity

- o Sewer service charges are based on use and not ability to pay.
- o User charges, connection fees and property tax increases would impact low and moderate income households differently than high income households.
- o Development and housing impacts may affect the ability of low and moderate income families to afford adequate housing.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 5.1 Expand capacity of existing facilities and provide new facilities for municipal sewage collection, treatment and disposal according to the 20 year project list. Level of treatment to depend on State and Federal regulations.	Existing sewerage service facilities must be expanded to service the needs of growing communities. Needed facilities are shown in the 20 year project list contained in Section J, updated annually. (This action would include Action 16.1, 16.3 and 16.4 of the Solid Waste Management Plan.)	Sewerage agencies.	See Section J.	FWPCA, Porter-Cologne Act, enabling legislation for cities and special districts	\$240,000,000	-0-	Federal & State grants + user charges + assessments.	RWQCB can impose sanctions for non-compliance with permit conditions.
Action 5.2 Issue and update limits for municipal discharges in conformance with EMP.		RWQCB.	Continuous.	Federal Water Pollution Control Act Amendments.	\$94,000	-0-	State appropriation.	EPA review.

Policy 6

ENCOURAGE CONSOLIDATION OF TREATMENT FACILITIES AND DISCHARGE OF WASTEWATER TO WELL-MIXED RECEIVING WATERS WHERE ECONOMICALLY JUSTIFIED AND ENVIRONMENTALLY DESIRABLE.

Action 6.1

Review all proposed facilities for consistency with above policy.

SWRCB, RWQCB, Bay Area 208 agency and ABAG in A-95 advisory capacity.	Continuous.	Federal Water Pollution Control Act Amendments.	\$4,000	\$4,000	State appropriation & EPA grants.	ABAG Facilities must be consistent with plan to be grant eligible.
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ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 5.	Impacts same as noted for Policy 5.	Impacts same as noted for Policy 5.	Impacts same as noted for Policy 5.
Impacts same as noted for Policy 5.	Impacts same as noted for Policy 5.	Impacts same as noted for Policy 4.	Impacts same as noted for Policy 4.
<u>Air Quality</u> <ul style="list-style-type: none"> o Temporary dust problems during construction of plants and interceptors. <u>Water Quality</u> <ul style="list-style-type: none"> o May improve plant reliability and water quality if inefficient small plants eliminated. o May improve local water quality if discharges to poorly mixed waters eliminated. <u>Physical Resources</u> <ul style="list-style-type: none"> o May improve marine or water oriented resources if water quality is improved. o Might lead to greater use of construction resources than alternative plan--or, depending on plan, may save resources. o Would benefit fish and wildlife resources in areas where water quality is improved (especially poorly mixed areas). o Plants, interceptors and concentration of discharge points in new areas of the Bay could disrupt fish and wildlife resources and ecological balance in marshes. <u>Energy</u> <ul style="list-style-type: none"> o Could require energy to move sewage to new treatment locations but may save some energy in treatment. <u>Amenities</u> <ul style="list-style-type: none"> o Facility and interceptor construction, operation and design may have adverse visual, odor and noise effects. 	<u>Financial</u> <ul style="list-style-type: none"> o Would directly determine grant eligibility of proposed alternative. o Would eliminate grant funding for non-approved projects. o May produce economies of scale in consolidation of facilities. o Would broaden service area and financial base for single facility. <u>Institutional</u> <ul style="list-style-type: none"> o May eliminate or require consolidation of some sewage treatment agencies. o At times would require plans of low institutional acceptability--resulting in resistance. o Would require high level of technical staffing at ABAG. o Would provide enforcement for regional policy. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment - one large facility and service agency may require fewer employees than two component facilities/agencies. o Change in construction employment for new construction vs. renovation is indeterminable. <u>Income and Investment</u> <ul style="list-style-type: none"> o Impacts will depend upon specific situation. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Changes in costs of sewerage services (increases vs. decreases) would depend on specific situation. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o Number of housing units accommodated by consolidations would vary (as would cost effects). <u>Physical Mobility</u> <ul style="list-style-type: none"> o Localized, short term disruptions in mobility may result during construction, especially of interceptors. <u>Sense of Community</u> <ul style="list-style-type: none"> o Impacts would be highly dependent on specific actions taken to consolidate facilities. <u>Urban Patterns</u> <ul style="list-style-type: none"> o Effects on land use would depend on actions taken to consolidate facilities. <u>Equity</u> <ul style="list-style-type: none"> o Impacts would depend on financing mechanisms and profile of population in service areas affected. o Other impacts on special population groups would depend on effects on costs of housing and who would benefit from jobs created.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 7

ACCELERATE PROGRAMS TOWARD RECLAMATION AND REUSE OF WASTEWATERS.

(See Water Supply Plan)

Policy 8

ESTABLISH A PROGRAM OF SURFACE RUNOFF CONTROLS THAT EMPHASIZE LOW COST MEASURES TO REDUCE THE POLLUTANT LOAD FROM THIS SOURCE.

Action 8.1

Implement county surface runoff plans (Appendix C volume), after adoption by the cities and county within each county.

Counties acting as lead agencies for local general purpose governments, and perhaps RCDs and other special districts.

See county plans in Appendix C volume.

Local ordinances. City and county charters, special district enabling legislation; State constitution; FWPCA; Porter-Cologne Act.

Undetermined, at least \$250,000

\$250,000

RWQCB action

Action 8.2

Conduct regional aspects of surface runoff programs.

Regional aspects include modeling of effects on Bay-Delta, public education, model ordinances, assistance on determination of management practices.

ABAG/RWQCB

Continuous. Porter-Cologne Act; FWPCA

To be determined

Federal 208 funds and/or State program funds.

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Actions 8.1 through 8.16 of the draft EMP were deleted. These actions were included in the draft plan as a summary of the measures in the county surface runoff management plans. The actions were replaced by two actions, one implementing the county plans, and the second for conduct of regional aspects of surface runoff. The assessment tables on the following pages indicate the impacts that can be anticipated from measures in the county plans.

These impacts apply to Policy 8 and its two actions.

Air Quality

- o Temporary and localized air pollutant emission increases may occur during sweeping operations
- o Reduced quantities of dust available for suspension as particulate matter

Water Quality

- o Reduced transport of heavy metals, nutrients, pesticides, organic and microbiological pollutants into water bodies. Typical removals: 30-50% total solids, 25-40% BOD, 25-40% Kjeldahl nitrogen, 8-20% phosphate, 25-60% heavy metals
- o Reduced incidence of impaired uses (e.g., water supply) of water bodies

Physical Resources

- o May indirectly benefit aquatic organisms
- o Enhanced water recreation potential and use
- o May reduce landfill capacities needed to accommodate residues.

Energy

- o Sweeping equipment uses energy

Amenities

- o Improved visual amenities on paved surfaces and in water bodies e.g., reduced floatable solids
- o Temporary, localized noise level increases from equipment operation (70-80 dBA at 50' on flat grade) May be mitigated by noise abatement measures

Financial

- Direct Public Costs of Implementation
 - o See County Surface Runoff control Plans Cost Data
 - o Example Costs of Street Sweeping Programs

\$16 per cu. yd. of material collected

\$18 per ton of material collected

\$4-5 per curb mile

Fiscal Effects on Local Governments

- o Direct impacts on fiscal resources depend on revenue source(s) used - See County Plans

Institutional

- o May require intergovernmental coordination
- o May require additional staff resources to improve efficiency of sweeping programs
- o May impact other public service levels

Production of Goods & Services

- o Employment - Creation of job opportunities in the private sector may result (administrative and operation and maintenance jobs)

Income and Investment

- o No impacts

Consumer Expenditures

- o No impacts

Housing Supply

- o No impacts

Physical Mobility

- o Temporary, localized disruption of physical mobility may result during sweeping operations. Can be mitigated by scheduling work during off-peak hours

Health & Safety

- o Reduced health risks associated with water quality improvements and vector control benefits

Sense of Community

- o Visual amenity benefits on streetscape and in urban access water bodies may enhance the sense of community

Equity

- o Indirect impacts on special population groups would depend on the financing mechanisms proposed for implementation. In general, payment through the property tax mechanism differentially impacts low- and moderate-income groups

Urban Patterns

- o No impacts

Improved Street Sweeping



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. 	<u>Financial</u> <ul style="list-style-type: none"> Direct Public Costs of Implementation <ul style="list-style-type: none"> o See County Surface Runoff control Plans Cost Data. Fiscal Effects on Local Governments <ul style="list-style-type: none"> o Direct impacts on fiscal resources depend on revenue source(s) used- (See County Plans) program costs may be offset by additional taxes on sale of chemicals and distributors licenses. Control of sales may reduce or redistribute local revenues from product sales. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment- Job impacts (creation or elimination) would depend on control proposals effects on production. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impacts.
<u>Water Quality</u> <ul style="list-style-type: none"> o Reduced amounts of toxic constituents in water bodies. o Reduced incidence of impaired uses (e.g. water supply) of water bodies. 	<u>Institutional</u> <ul style="list-style-type: none"> o Improved regulation and enforcement may require intergovernmental coordination. o Public opposition to control of chemicals may occur. o May require additional public agency staff to do research, public education and information, and regulation. 	<u>Income and Investment</u> <ul style="list-style-type: none"> o Effects on wages and salaries depends on control effects on production and thereby on employment. o Effects on profits depends on effects of control proposals on production (increase or decrease demand) and availability of substitute products. 	<u>Health and Safety</u> <ul style="list-style-type: none"> o Controls on chemical use may restrict vector and nuisance plant control program efforts or require shifts to biological controls. o Education on use of potentially harmful chemicals should reduce health and safety risks.
<u>Physical Resources</u> <ul style="list-style-type: none"> o Reduced risks of fish kills, exposure of plant and animal species to harmful substances. o Regulation of chemicals used in agricultural production processes, timber management programs etc. may adversely affect use of the resource base. May be mitigated by alternatives such as organic fertilizers and biological pest controls. o See also Hazardous Waste Assessment of Solid Waste Management Recommendations. 		<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Product prices may increase if added costs to producers of chemicals due to controls can be passed on to the consumer or production cost increases (e.g. food costs) are passed on. o Consumers may elect to reduce consumption of certain chemicals or switch to substitutes due to price increases or new information on environmental effects. 	<u>Sense of Community</u> <ul style="list-style-type: none"> o No impacts.
<u>Energy</u> <ul style="list-style-type: none"> o Reduced use of energy intensive chemicals would not appreciably affect energy demand or supply. 			<u>Equity</u> <ul style="list-style-type: none"> o Effects on special population groups depends on financing mechanisms and use of products subject to price increases.
<u>Amenities</u> <ul style="list-style-type: none"> o No impacts. 			<u>Urban Patterns</u> <ul style="list-style-type: none"> o No impacts.

Controlling Use of Certain Chemicals



ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o Reduced odors when accumulated debris is removed; decomposition prevented.
- o Temporary, localized air pollutant emission increases may occur during cleaning operations when motorized vehicles are used.

Water Quality

- o Removal of accumulated solids (sediments, litter, leaves) may reduce BOD, Nitrates, Phosphates and oil and grease loads to water bodies from first flush effects of storms.
- o Reduced incidence of impaired uses (e.g. water supply) of water bodies.

Physical Resources

- o May benefit aquatic organisms.
- o May impact land fill capacities where increased cleaning results in increased quantities of solids for disposal (e.g. 1 T. material/year/catch basin; open drainage channel deposits vary).

Energy

- o Motorized equipment uses fuel.

Amenities

- o Temporary localized noise level increases from equipment operation may be mitigated by noise abatement measures.

Financial

Direct Public Costs of Implementation

- o See County Surface Runoff control Plans Cost Data.

Example Costs:

Catch basin Cleaning Costs \$6-8/catch basin or \$4-15/cu yd. Material Collected; Sewer Cleaning Costs \$50-100/cu. yd. material removed.

Fiscal Effects on Local Government

- o Direct impacts on fiscal resources depend on revenue source(s) used - See County Plans.
- o May be consolidated with on-going sewer system maintenance program costs.

Institutional

- o May require additional staff resources (public works personnel on short term basis and inspection, administrative personnel on long-term basis) or reallocation of resources.
- o May result in displacement of another public service (or level of service) during concentrated cleaning effort periods.
- o May result in agency staff opposition to changed work assignments and schedules and added work loads.

Production of Goods and Services

- o Employment- Creation of job opportunities in the private sector may result (e.g. engineering consultants, equipment manufacturers, monitoring and inspection personnel).

Income and Investment

- o Effects on wages and salaries depend on need for additional staff to meet demand.
- o Increased profits may result from demand for private sector goods and services.

Consumer Expenditures

- o No impacts.

Housing Supply

- No impacts.

Physical Mobility

- o Temporary, localized disruptions in physical mobility may occur during cleaning operations. May be mitigated by scheduling operations during off peak hours.

Health and Safety

- o Water quality benefits may have indirect health benefits.
- o Cleaning activities may also benefit flood control channel maintenance.

Sense of Community

- No impacts.

Equity

- o Impacts on special population groups depends on the financing mechanism(s) chosen to implement and the job benefits distribution.

Urban Patterns

- No impacts.

Clean Storm Collection System



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Air Quality

- o Reduced incidences of odors associated with decomposing debris and litter in water bodies and stormwater collection systems.

Water Quality

- o Reduced litter and organics (BOD phosphorus, nitrogen) available for introduction to stormwater system and waterbodies.
- o Reduced blockage of storm channels.
- o Reduced incidence of impaired uses (e.g., water supply) of waterbodies.

Physical Resources

- o May indirectly benefit aquatic organisms.
- o Enhanced water recreation potential and use where debris and litter associated pollution impairs use.
- o May impact solid waste management practices - landfill capacities may be affected by added quantities of solids for disposal; may be an added incentive for recycling, neighborhood composting and other resource recovery programs.

Energy

- o When augmenting alternative solid waste management programs, may benefit energy conservation efforts.

Amenities

- o Visual amenity benefits of cleaner landscapes and reduced debris in waterbodies.

Financial

Direct Public Costs of Implementation

- o See County Plans Cost Data.

Fiscal Effects on Local Government

- o Direct impacts on fiscal resources depend on source(s) of revenue used to fund program efforts - See County Plans.
- o State subvention funds and fines may offset costs of enforcement and education.
- o Reduced amounts of litter may result in cost savings in waste collection programs.

Institutional

- o May require intergovernmental coordination between State, regional and local government agencies and special districts.
- o Improved enforcement and intensified anti-litter advertising campaign may require additional staff or reallocation of agency personnel.

Production of Goods and Services

- o Employment - no impact expected in private sector.

Income and Investment

- o Public employment benefits may result in increases in wages and salaries.

Consumer Expenditures

- o No impacts.

Housing Supply

- o May indirectly benefit housing rehabilitation programs where litter control programs improve aesthetics of neighborhoods.

Physical Mobility

- o No impacts.

Health and Safety

- o Water quality improvements may have indirect health benefits.
- o Reduced litter may enhance vector control programs by eliminating or reducing habitats.

Sense of Community

- o Enhanced neighborhood aesthetics may contribute to improved sense of community.

Equity

- o Impacts on special population groups depends on financing mechanism(s) chosen to implement the program.
- o Where programs reduce litter and vectors with associated health benefits in areas with large concentrations of special population groups, those groups will benefit.

Urban Patterns

- o No impacts.

Control Littering



ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o May reduce incidence of odors associated with decomposing debris in water bodies and stormwater collection systems

Water Quality

- o Reduced amounts of debris and oil may reduce BOD, phosphates, nitrogen, suspended solids, heavy metals introduced to stormwater system and waterbodies
- o Less oil would be available to leach into groundwater supplies
- o Reduced incidence of impaired uses (e.g., water supply) of water bodies

Physical Resources

- o May indirectly benefit aquatic organisms by removing toxic substances from the environment
- o Enhance water-oriented recreation potential and use where dumping of debris and oil impairs use
- o Reduced dumping could reduce quantities of solid waste which are disposed of in landfills
- o Waste from re-refineries is high in concentrated metals and sulfur. Sludge created will require careful solids management

Energy

- o Oil recycling may augment energy conservation efforts - 700 homes could be heated with BTU equivalent of oil currently dumped
- o Recycled oil can be used to produce other energy consumptive products such as asphalt
- o Re-refineries use part of waste product as fuel to power lighting and pump operations

Amenities

- o Visual amenity benefits from cleaner landscape and less debris and oil slicks in water bodies

Financial

- Direct Public Costs of Implementation
 - o See County Surface Runoff Management Plans Cost Data

Fiscal Effects on Local Governments

- o Direct impacts on fiscal resources depend on source(s) of revenue used to fund programs - See County Plans
- o Reduced dumping may result in some cost and savings in public works programs (Ex. cost to remove oil dumped is \$ 150/gallon)
- o Fines for illegal dumping may offset costs of additional enforcement efforts
- o Use of re-refined oil by public agencies would result in savings in fleet operation and maintenance costs
- o Public agency oil recycling would generate revenues from sale of oil to re-refineries

Institutional

- o May require additional staff resources to improve regulation and enforcement and educate public
- o May require cooperation of public agencies with regulatory and program responsibilities for control of dumping and oil recycling
- o May require additional regulations and guidelines to ensure proper labeling, handling and accessibility to re-refined oil

Production of Goods & Services

- o Employment - Job opportunities may result if extensive oil recycling programs stimulate demand for more recycling firms
- o Production of recycled oil may increase
- o Additional firms may enter the market to meet increased demand

Income & Investment

- o Increased wages and salaries may result from jobs created
- o May increase profits of firms benefited by increased oil recycling (Example: (prices fluctuate with oil costs) - service stations receive 8¢/gallon, used oil collection agents - 16¢/gallon, re-refineries \$1.20 - 1.60/gallon)

Consumer Expenditures

- o Retail markets for re-refined oil are generally lacking. At such time as they are developed, consumers would receive the benefit of access to cost savings in purchase of re-refined oil

Housing Supply

- o No impact

Physical Mobility

- o No impact

Health & Safety

- o Water Quality improvements may have indirect health benefits
- o Reduced dumping of debris and oil may augment vector and nuisance plant control program

Sense of Community

- o Enhanced neighborhood and physical environment aesthetics may contribute to improved sense of community

Equity

- o Impacts on special population groups depends on financing mechanism(s) chosen to implement the programs
- o Where programs reduce dumping and aid vector control and associated public health and enhancement in areas with large concentrations of special population groups, those groups will benefit

Urban Patterns

- o No impacts

Control Dumping



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Air Quality

- o Localized increases in air emissions from repair equipment.
- o Reduced dust available for introduction as particulate matter.

Water Quality

- o Reduced total street contaminant loads which contribute to total suspended solids, BOD and toxic substances in urban runoff.
- o Reduced incidence of impaired uses (e.g. water supply) of water bodies.

Physical Resources

- o May indirectly benefit aquatic organisms.
- o May require physical resources to produce repair products.

Energy

- o Repair equipment uses energy as does production of asphalt and other repair products.

Amenities

- o Localized, temporary increases in noise levels during repair operations.

Financial

Direct Public Costs of Implementation

No costs above current commitments.

Fiscal Effects on Local Governments

- o Federal and State grant subvention funds offset much of cost of street repair with remainder coming from local general revenue funds.

Institutional

- o No impacts.

Production of Goods and Services

- o No impacts.

Income and Investment

- o No impacts.

Consumer Expenditures

- o No impacts.

Housing Supply

- o May indirectly benefit housing rehabilitation programs where street repair and maintenance improves accessibility and street systems in rehabilitation areas.

Physical Mobility

- o Local temporary disruption in physical mobility during repair operations.

Health and Safety

- o Water quality improvements may have indirect health benefits.
- o Street repair programs have public safety benefits.

Sense of Community

- o Streets kept in good repair may enhance neighborhood sense of community.

Equity

- o No impacts

Urban Patterns

- o No impacts.

Repair Streets



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See Impact Assessment of Policy 11

Ensure Proper Operation of Septic Tanks



Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Other Measures



ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o Localized reductions in dust/particulate matter from construction activities.

Water Quality

- o Reduced amounts of sediments and nutrients entering waterbodies from agricultural and construction activities.
- o Reduced siltation of stream channels, lakes and reservoirs and annual sediment loadings to the Bay contributed by land disruption by human activities.
- o Reduced turbidity, algae blooms, and oxygen depletion in streams, lakes and reservoirs.
- o Reduced incidence of impaired use (e.g., water supply) of waterbodies.
- o Reduced amounts of suspended solids available for chemical, pesticide and heavy metal binding.

Physical Resources

- o Reduced incidence of burial of aquatic bottom organisms and fish kills may result.
- o Indirectly benefits productivity of aquatic community by preventing or reducing interference with photosynthesis, elimination of food sources.
- o Reduced losses of productive topsoil, organic matter should enhance the productivity of agriculture and timber production activities.
- o May indirectly enhance recreation potential and use of waterbodies and adjacent lands.

Energy

- o May indirectly result in energy savings where dredging activities are reduced.

Amenities

- o Visual amenity benefits of less turbid waters and reduced eroded areas.
- o Visual amenity benefits of preserving the natural state of the environment.

FinancialDirect Public Costs of Implementation

- o See County Surface Runoff control Plans Cost Data.
- o See Council of Bay Area Resource Conservation Districts Handbook of Best Management Practices for example costs.

Fiscal Effects on Local Governments

- o Direct impacts on fiscal resources depend on revenue source(s) used - See County Plans.
- o Permit and plan review fees may offset local costs to implement and enforce.
- o Performance bonds may offset costs of clean-up.
- o Savings in operation and maintenance costs (e.g., in reservoirs) of local governments and special districts may result - an estimated \$5 million is spent annually to alleviate lake problems such as siltation, algae blooms, aquatic weeds, fish kills, etc.

Institutional

- o Effective implementation would require the cooperation of numerous public agencies such as National Park Services, U. S. Geological Survey, Corps of Engineers, California Department of Fish & Game, Flood Control and Water Districts, cities and counties.
- o New or amended ordinances, regulations or administrative rule-making may be required.
- o Some aspects of erosion control programs may meet with public opposition.
- o Additional staff resources may be required to implement and enforce the recommendations.

Production of Goods and Services

- o Employment - Creation of job opportunities may result (e.g., landscape and engineering consultants, construction firms).
- o Increased demand for goods and services may result in some new firms entering market.

Income and Investment

- o Effects on wages and salaries depends on control measures effects on production and employment.
- o Increased profits for firms benefiting from increased demand for goods and services.
- o Profit of firms and individuals bearing costs of controls should not be affected assuming costs can and will be passed on to the consumer (industry dependent response).

Consumer Expenditures

- o Where private industry costs to control erosion are passed on in product prices, costs of goods and services will increase.

Direct Private Costs of ImplementationExample Costs of Erosion Control and Agricultural Management Practices:

Hydroseeding/Hydrumulching
\$425-900/acre

Siltation Berm
\$7.33/lineal foot

Waterway Fencing
\$1-2.75/lineal foot

Range Seeding
\$18/acre

Construction erosion controls for 80 unit subdivision may cost \$500-700/acre.

Housing Supply

- o Decreased supply (e.g., < 200/acre instead of < 400/acre on slopes $\geq 15\%$) and increased costs of housing (e.g., the average price of a house may increase \$200-600 - an example design and installation cost of a best management practice) may result where erosion controls are a new component of the development approval process.

Physical Mobility

- o Localized, temporary disruption in physical mobility during construction activities.

Health and Safety

- o Indirect public safety benefits of reduced flood peaks and flood risks associated with siltation and alteration of natural flow regimes in streams.
- o Reduced erosion and mudslide risks.
- o Reduced likelihood of development in hazardous areas with attendant public safety benefits.
- o Reduced conditions conducive to propagation of vectors and other noxious plant and animal species.
- o Retention or debris basins may become a health hazard if water stagnates and vector problems result or a safety hazard (drowning).

Sense of Community

- o No impacts.

Equity

- o Indirect impacts on special population groups depends on financing mechanism(s) proposed as well as actual impacts on housing supply and costs.

Urban Patterns

- o Erosion control requirements should not in and of themselves affect urban patterns.

Control Erosion/Improve Agricultural Practices



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Impacts same as noted for Establish Water Quality Monitoring Program.

Impacts same as noted for Establish Water Quality Monitoring Program.

Impacts same as noted for Establish Water Quality Monitoring Program.

Sense of Community

- o Public education/information programs about surface runoff problems and solutions could indirectly improve the sense of community.

Other impacts are same as noted for Establish a Water Quality Monitoring Program.



ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Impacts same as noted for Control Dumping.

Divert Runoff From Contaminated Areas



See Impact Assessment for Policy 5 of the Water Quality Management Plan (Provide Facilities Needed for Municipal Sewerage Service and Water Quality Protection

Treat and Store Runoff



Impacts same as noted for Control Dumping & Control Erosion.

Impacts same as noted for Control Dumping & Control Erosion.

Impacts same as noted for Control Dumping & Control Erosion

Impacts same as noted for Control Dumping & Control Erosion

Control Land Use Along Creeks



<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts 	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o See County Surface Runoff control Plans Cost Data Fiscal Effects on Local Governments <ul style="list-style-type: none"> o Direct impacts on fiscal resources depend on revenue source(s) used - See County Plans o Cost savings may result where monitoring consolidation occurs 	<u>Production of Goods & Services</u> <ul style="list-style-type: none"> o Employment - may create employment for sampling and analysis personnel in public and private laboratories <u>Income & Investment</u> <ul style="list-style-type: none"> o Will require capital investment for sampling and analysis when that is a new function for a management agency and is not contracted to private firms <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impacts 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impacts <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impacts <u>Health & Safety</u> <ul style="list-style-type: none"> o Indirectly would benefit public health through water quality improvements o Could uncover health and safety problems meriting solution <u>Sense of Community</u> <ul style="list-style-type: none"> o No impact
<u>Water Quality</u> <ul style="list-style-type: none"> o Indirectly improves water quality - provides data to make informed decisions 			<u>Equity</u> <ul style="list-style-type: none"> o No impact
<u>Physical Resources</u> <ul style="list-style-type: none"> o Indirectly benefits physical resources as water quality and land management practices improve 	<u>Institutional</u> <ul style="list-style-type: none"> o May require additional staff to increase monitoring activities o Would require cooperation and coordination among the numerous agencies involved in water quality monitoring 		<u>Urban Patterns</u> <ul style="list-style-type: none"> o No impact
<u>Energy</u> <ul style="list-style-type: none"> o No impacts 			
<u>Amenities</u> <ul style="list-style-type: none"> o Indirectly affects amenities - highly dependent on nature of actions taken as a result of monitoring data 			

Establish Water Quality Monitoring Program



ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o May indirectly benefit air quality when surface runoff management coordinates with air quality protection measures.

Water Quality

- o Indirect improvements in water quality as data, information and plans improve decision-making about surface runoff management.

Physical Resources

- o Indirect benefits to aquatic resources as overall water quality improves.
- o Indirect benefits of enhanced recreation potential and use from improved water quality and land management.

Energy

- o Surface runoff management practices may use energy; others may reduce use of energy by substituting management controls for energy consumptive structural controls.

Amenities

- o Indirect improvement of land and water visual amenities and natural state of environment.

FinancialDirect Costs of Implementation

- o See County Surface Runoff Management Plans Cost Data

ABAG Costs -Fiscal Effects on Local Governments

- o Depends on source(s) of revenue used - See County Plans.

Institutional

- o Requires aggressive leadership by County 208 lead agency staff.
- o Requires involvement and cooperation of numerous agencies.

Production of Goods and Services

- o Employment- Jobs may be created to carry out and meet new requirements if developed in the CPP.

Income and Investment

- o May indirectly increase or decrease profits of firms affected by new requirements if developed in the CPP.

Consumer Expenditures

- o Prices of goods and services may increase if new requirements are developed in the CPP.

Housing Supply

- o May indirectly affect the supply and cost of housing if new requirements result from the CPP which affect housing.

Physical Mobility

- o Localized short-term disruption in physical mobility where controls noted to have mobility impacts (Policy 1-17) are continued.

Health and Safety

- o Indirect health benefits from water quality improvements.

Sense of Community

- o May indirectly affect the sense of community depending on recommendations of CPP.

Equity

- Impacts on special population groups depends on financing mechanism(s) proposed and effects of CPP proposals and findings on housing and jobs. Incidence analysis should be one review requirement of a program to develop financing mechanisms.

Urban Patterns

- o May indirectly affect land use.

Establish a Surface Runoff Administrative Structure and Procedures for Continuing Planning



WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 9 PROVIDE FACILITIES NEEDED FOR INDUSTRIAL WASTEWATER TREATMENT AND DISPOSAL AND WATER QUALITY PROTECTION.								
Action 9.1 Expand existing and provide new facilities for treatment and disposal of industrial wastes discharged directly to receiving waters.	Direct industrial discharges that may have to be treated to a higher degree than at present are listed in Section K.	Individual pri- See Section vate companies. K.			At least \$25,000,000 to \$50,000,000	-0-	Private funds. Low-interest rate loans available authorized by California Pollution Control Financing Act.	RWQCB can impose sanctions for non-compliance with permit conditions.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Water Quality</u> <ul style="list-style-type: none"> o Receiving waters would have lowered levels of pollutants such as: ammonia, bacteria, phosphorus, toxic organic compounds and heavy metals. o Less frequent oxygen depletion in localized areas of the Bay. <u>Physical Resources</u> <ul style="list-style-type: none"> o Increased amounts of toxic wastewater residuals would require additional capacity in limited hazardous waste disposal sites. o Directly consumes construction materials. o Would benefit fish and wildlife resources in areas where industrial discharges are eliminated or toxic levels reduced. <u>Energy</u> <ul style="list-style-type: none"> o Increased energy consumption would result from the addition of pollution abatement processes. <u>Amenities</u> <ul style="list-style-type: none"> o No impacts. 	<u>Financial</u> <ul style="list-style-type: none"> o See individual actions. <u>Institutional</u> <ul style="list-style-type: none"> o See individual actions. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Approximately 3400 temporary and 800 permanent jobs to construct and operate industrial treatment facilities. o Production in certain sectors may be reduced by plant closures. o Some industries have achieved increased production efficiency. o In some cases may cause closure of some small industries--primarily in urban areas--if discharge requirements can't be met. May be mitigated by bond guarantee program of Small business Administration. <u>Income and Investment</u> <ul style="list-style-type: none"> o Investment in pollution control facilities. o Investment funds would be withdrawn from other areas of industrial activity. o Probable increases in pollution control workers wages. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o See individual actions. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o Housing industry is sensitive to diversion of investment funds. o Impacts on the supply and cost of new housing may result. <u>Urban Patterns</u> <ul style="list-style-type: none"> o In some cases may cause closure of industries--primarily in urban areas--if discharge requirements can't be met. o In other cases provides mechanism to allow industrial growth--and thereby urban growth--in conformance with Federal and State discharge requirements and needs of Bay Area environment. <u>Health and Safety</u> <ul style="list-style-type: none"> ■ Indirectly protects health and safety by removing gross toxicants and infectious agents from receiving waters. <u>Physical Mobility</u> <ul style="list-style-type: none"> ■ See individual actions. <u>Sense of Community</u> <ul style="list-style-type: none"> ■ Plant closures, job losses and out migration could alter community stability and character as community profiles change. This effect would be felt more in urban areas. <u>Equity</u> <ul style="list-style-type: none"> o See individual actions.
<p>Impacts same as noted for Policy 9.</p>	<u>Financial</u> <ul style="list-style-type: none"> o No impacts. <u>Institutional</u> <ul style="list-style-type: none"> o No impacts. 	<p>Direct Private Cost of Implementation</p> <ul style="list-style-type: none"> o (1978-2000) \$25,000,000/year (annualized costs @ 8% derived from national level estimates). <u>Consumer Expenditures</u> <ul style="list-style-type: none"> ■ If pollution control measures are financed by increased costs of products, then consumer expenditures will increase. <p>Other economic impacts are the same as noted for Policy 9.</p>	<u>Physical Mobility</u> <ul style="list-style-type: none"> o Treatment costs borne by the petroleum industry may cause a rise in fuel prices and reduce mobility of population. <u>Equity</u> <ul style="list-style-type: none"> ■ Increased prices of consumer goods tend to disproportionately impact low and moderate income groups. <p>Other social impacts are the same as noted for Policy 9.</p>

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 9.2 Issue and update permits for direct industrial discharges.		RWQCB.	Continuous.	Federal Water Pollution Control Act Amendments & Porter-Cologne Act.	\$220,000	-0-	State appropriation.	EPA review.
Action 9.3 Expand existing and provide new facilities for pretreatment of industrial wastewaters discharged to municipal sewer systems.	Only that degree of treatment necessary to meet the municipalities discharge requirements are recommended at this time.	Individual private companies.	Continuous.		Undetermined. If all indirect dischargers had to treat to same level as direct dischargers, cost would be \$15,000,000.	Undetermined	Private funds, Low-interest rate loans	Sewerage agencies actions.
Action 9.4 Issue and update permits for industrial discharges to municipal sewer systems.		Sewerage agencies.	Continuous.		Undetermined	Undetermined	User charges.	RWQCB action.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 9.	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o (1977-2000) \$217,000/year (current cost of RMQCB effort). Fiscal Effects on Local Government <ul style="list-style-type: none"> o No change from current costs and methods of financing permitting programs. <u>Institutional</u> <ul style="list-style-type: none"> o No impacts - no change from current practices of permitting agencies. 	<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impacts. Other economic impacts are the same as noted for Policy 9.	<u>Physical Mobility</u> <ul style="list-style-type: none"> o No impacts. <u>Equity</u> <ul style="list-style-type: none"> o No impacts. Other social impacts are the same as noted for Policy 9.
<u>Water Quality</u> <ul style="list-style-type: none"> o Reduction of toxic discharges to sewers would protect sewage treatment plants from upset and decrease toxicant discharges to environment. Other environmental impacts are the same as noted for Policy 9.	<u>Financial</u> <ul style="list-style-type: none"> o No impact. <u>Institutional</u> <ul style="list-style-type: none"> o No impact. 	Direct Private Costs of Implementation <ul style="list-style-type: none"> o (1978-2000) \$15,000,000/year (annualized costs derived from national level estimates). Other economic impacts are the same as noted for Policy 9.	<u>Physical Mobility</u> <ul style="list-style-type: none"> o No impacts. Other social impacts are the same as noted for Policy 9.
Impacts same as noted for Policy 9.	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o Exact current expenditures by sewerage service entities is not known. Fiscal Effects on Local Government <ul style="list-style-type: none"> o No changes from present practices. <u>Institutional</u> <ul style="list-style-type: none"> o Impacts same as noted for Action 9.2. 	Impacts same as noted for Action 9.2	Impacts same as noted for Action 9.2

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 10 REDUCE SEWAGE POLLUTION FROM VESSELS, INCLUDING HOUSEBOATS, IN THE BAY-DELTA SYSTEM.								
Action 10.1 Improve monitoring and documentation of vessel waste pollution.	Conducting periodic bacterial sampling of waters at all areas of small boat congregation; document effectiveness of current programs.	RWOCB in consultation with county health departments.	Quarterly; commencing Dec., 1978	Porter-Cologne Act.	\$150,000	\$150,000	State & EPA grants.	
Action 10.2 Conduct public hearing(s) and establish discharge prohibition as appropriate.	If discharge prohibition for entire Bay-Delta system isn't justified based on information currently available, the results of action 10.1 will be used to determine the need for prohibitions in environmentally sensitive areas.	RWOCB	June 1978.	Porter-Cologne Act	-0-	-0-	State program funds	

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Water Quality</u> <ul style="list-style-type: none"> o Reduced coliform bacteria contamination of waters in harbors and marinas and shellfish harvesting areas. <u>Physical Resources</u> <ul style="list-style-type: none"> o Enhanced water recreation potential and use - particularly marine organism harvesting. <u>Energy</u> <ul style="list-style-type: none"> o Facility construction and operation requires energy; actual increased demand would be minor. <u>Amenities</u> <ul style="list-style-type: none"> o Indirect visual amenity impacts - reduced amounts of floatable sewage solids. 	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o See below. Fiscal Effects on Local Governments <ul style="list-style-type: none"> o See below. <u>Institutional</u> <ul style="list-style-type: none"> o May require legislative amendments. o May require intergovernmental coordination. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment - Approximately 70 temporary and 17 permanent public and private sector job opportunities may result (basic and service sector). <u>Income and Investment</u> <ul style="list-style-type: none"> o Increased employment would increase wages and salaries in construction and equipment supply. o Increased capital investments (see example below) may be required. o Increased profits may result for firms where production increases as a result of increased demand for products and services. o No impacts on profits of firms bearing costs of requirements, assuming costs can be passed on to consumers. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Increased prices of goods and services at marinas would result. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impacts. <u>Physical Mobility</u> <ul style="list-style-type: none"> o Reduced pleasure craft travel time to pumpout facilities. <u>Health and Safety</u> <ul style="list-style-type: none"> o Reduced incidence of water quality related public health risks should accompany water quality improvements. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impacts. <u>Equity</u> <ul style="list-style-type: none"> o Where costs of new requirements are wholly borne by boat owners the costs of pollution cleanup would fall on the source of pollution. <u>Urban Patterns</u> <ul style="list-style-type: none"> o No impacts.
Impacts same as noted for Policy 10.	<u>Financial</u> Direct Public Costs of Implementation (1978-200) \$150,000/year (Administrative/Regulatory costs for Annual Monitoring Effort) Fiscal Effects on Local Governments <ul style="list-style-type: none"> o No impact. <u>Institutional</u> <ul style="list-style-type: none"> o Requires cooperation of RWQCB. 	Impacts same as noted for Policy 10.	Impacts same as noted for Policy 10.
<u>Water Quality</u> <ul style="list-style-type: none"> o Discharge prohibitions would require use of holding tank devices that are more reliable than flow-through devices now permitted. 	<u>Financial</u> Direct Public Costs of Implementation <ul style="list-style-type: none"> o Incremental cost increases in on-going Coast Guard inspection and enforcement efforts. Fiscal Effects on Local Governments <ul style="list-style-type: none"> o Direct impacts on local government fiscal resources may result. <u>Institutional</u> <ul style="list-style-type: none"> o Impacts same as noted for Policy 10. 	<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Holding tank systems that are cheaper than flow-thru type devices would be required. o Boat owners with flow-thru type devices would bear additional cost of converting to holding tanks. o \$40 to \$250 typical cost for holding tank systems. Other economic impacts are the same as noted for Policy 10.	Impacts same as noted for Policy 10.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	IMPLEMENTING AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 10.3 Inform boating public of marine sanitation device programs.	Provide information on types of devices, matching shoreside facilities, schedules, procedures and costs.	RWQCB, U.S. Coast Guard	1978 & 1979	Porter-Cologne Act.	\$5,000	\$5,000	State appropriation, Federal program funds.	
Action 10.4 All marinas and harbors to provide vessel holding tank pump-out facilities.		Marina/harbor owner.	January, 1980.	Harbors and Navigation Code, Sec. 776, McAteer-Petris Act (as amended).	\$500,000	\$500,000	Owners-local and private funds; State Department of Navigation and Ocean Development (DNOD) funds.	SWRCB and BCDC permit programs.
Action 10.5 All marinas and harbors to provide on-shore toilet facilities.	For marinas, harbors, boat launch areas. Most appear to have adequate facilities--there are some exceptions.	Marina/harbor/ launch area owner.	January, 1980.	New State legislation required for existing facilities; McAteer-Petris Act (as amended) for new facilities.	Undetermined	Undetermined	Local and private funds; loans and grants from DNOD.	None yet for existing facilities; BCDC action for new facilities.
Action 10.6 Revise DNOD's loans and grants programs to fund pump-out facilities and on-shore toilets.	Presently funds pump-out facilities only as part of overall new harbor or marina package.	California Department of Navigation and Ocean Development.		Harbors and Navigation Code; Div. 1, Chapter 2, Article 3; Revision of DNOD policy required.	-0-	-0-	Harbors & Water Craft Revolving Fund; Motor Vehicle Fuel Fund.	Governor's Executive Order.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 10.	<u>Financial</u> Direct Costs of Implementation (1978 and 1979) \$30,000/year (Administrative Costs of Public Information Program) Fiscal Effects on Local Governments <ul style="list-style-type: none"> o No impacts. <u>Institutional</u> <ul style="list-style-type: none"> o No impact. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o No impacts. <u>Income and Investment</u> <ul style="list-style-type: none"> o No impacts. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impacts. 	Impacts same as noted for Policy 10.
Impacts same as noted for Policy 10.	<u>Financial</u> Direct Public Costs of Implementation Example Costs to Public Marinas for Pumpout Facilities: Capital (1980) \$20,000 < 100 berths \$45,000 > 100 berths O & M (1981-2000) \$2,000 - 4,500/year Administrative/Regulatory Costs to Ensure Compliance - Issue Permits: (1980) \$80,000/First Year (1981-2000) \$15,000/Year Fiscal Effects on Local Governments <ul style="list-style-type: none"> o Direct impacts on fiscal resources would result even with grant subvention. Fiscal impacts depend on revenue source used for local share of costs (user charges, bonds, revenue sharing). <u>Institutional</u> Impacts same as noted for Policy 10.	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment - Jobs may be created in consulting firms, pumping equipment manufacturing firms, other materials manufacturing and contracting or construction firms. <u>Income and Investment</u> <ul style="list-style-type: none"> o Impacts same as noted for Policy 10. (see also direct private costs). <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Prices of services at marinas (rental fees, pumpout fees) would increase. Direct Private Costs of Implementation Example Costs to Private Marinas for Pumpout Facilities: Capital (1980) \$20,000 < 100 berths \$45,000 > 100 berths O & M (1981-2000) \$2,000 - 4,500/year	Impacts same as noted for Policy 10.
Impacts same as noted for Policy 10.	<u>Financial</u> Direct Public Costs of Implementation Example Costs to Public Marinas for Toilet Facilities: Capital (1980) \$42,000/marina O & M (1981-2000) \$4,200/year (Administrative/Regulatory Costs are included in 10.4 costs.) <ul style="list-style-type: none"> o Most marinas appear to have adequate toilet facilities. Fiscal Effects on Local Governments <ul style="list-style-type: none"> o Impacts same as noted above for Action 10.4. <u>Institutional</u> <ul style="list-style-type: none"> o Requires new regulations and administrative rule-making. 	<u>Consumer Expenditures</u> Direct Private Costs of Implementation Example Costs to Private Marinas for Toilet Facilities: Capital (1980) \$42,000/marina O & M (1981-2000) \$4,200/year <ul style="list-style-type: none"> o Most marinas appear to have adequate toilet facilities. Other economic impacts same as noted for Action 10.4.	Impacts same as noted for Policy 10.

Assessment should be part of any amendment process of applicable State grants and loan programs. Amendment of the Department of Navigation and Ocean Development grant and loan program would, in general, distribute monies from gasoline tax revenues to both public and private marinas to pay for provision of facilities. Currently, public marinas charge nominal fees or do not charge at all for use of pumpout facilities.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
<p>Policy 11</p> <p>IMPROVE WASTEWATER DISPOSAL PRACTICES IN UNSEWERED AREAS</p>								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o Instances of odorous conditions due to system failures should decrease. <u>Water Quality</u> <ul style="list-style-type: none"> o Reduce coliform bacteria contamination of surface and ground waters. <u>Physical Resources</u> <ul style="list-style-type: none"> o Increased land requirements for on-site systems may result in competition with agricultural uses. o Increased water contact and non-contact (e.g. swimming, fishing, boating) recreation potential and use in streams and lakes now polluted by septic tank drainage. <u>Energy</u> <ul style="list-style-type: none"> o Onsite disposal systems use less energy than centralized sewerage treatment systems. <u>Amenities</u> <ul style="list-style-type: none"> o Visual amenity impacts-reduced likelihood of algal blooms from high nutrient concentrations in water bodies and in streams (especially during low flow periods). 	<u>Financial</u> <p>Direct Costs of Implementation</p> <p>See below</p> <p>Fiscal Effects on Local Government</p> <p>See below</p> <u>Institutional</u> <ul style="list-style-type: none"> o May require new legislation, amendments to regulations, codes. o May require intergovernmental coordination. o May require organizational changes 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment - Creation of approximately 50 temporary and 50 permanent new job opportunities in the public and private sectors may result. <u>Income Investment</u> <ul style="list-style-type: none"> o Increased wages and salaries in sectors where increased demand for goods and services results in new jobs. o Increased capital investments may be required. o Increased profits for firms where increased demand stimulates increased production. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Increased prices of goods and services may occur. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o Increased costs of existing housing maintenance and rehabilitation would result. o Location and density constraints may reduce new starts (supply) in areas proposing to use onsite system. o Increased new housing costs may result from decreased supply and costs to comply with new standards. <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impacts. <u>Health and Safety</u> <ul style="list-style-type: none"> o Reduced likelihood of raw sewage ponding on surface, discharging to water bodies and drainage ways. o Fewer conditions which promote vectors and other noxious species (e.g. rodents, mosquitos, flies, algae). o Reduced health risks associated with bacterial contamination of ground and surface waters. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impacts. <u>Equity</u> <ul style="list-style-type: none"> o Indirect impacts may result through impacts on costs of new and existing housing. o Where costs of new requirements or public management are wholly borne by residents of management area, the equity effects would depend on the social profile of the area and the financing mechanism chosen. <u>Urban Patterns</u> <ul style="list-style-type: none"> o Impacts on the location, timing, density, and amount of new development may result.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 11.1 Establish minimum regionwide standards for on-site disposal systems.	a) Standards for selection, design, evaluation and construction of on-site disposal systems. Standards would preclude substandard "interim" on-site systems awaiting a "future" sewer.	RWQCB with assistance from County Health Departments	By December 1979, annually thereafter.	Porter-Cologne Act, enabling laws for County Health Departments.	\$10,000	\$10,000	State funds, Federal grants, local funds.	SWRCB/RWQCB action
	b) Incorporate new standards in local building codes and ordinances.	City and county governments.	By April, 1980.	Local government enabling legislation.	Undetermined	Undetermined	Local funds.	
	c) Standards may vary depending on local conditions but must meet minimum requirements.							
Action 11.2 Inspect periodically new on-site wastewater disposal systems, including septic tanks, and establish procedures to ensure proper maintenance.	Inspection will be by public agencies.	Local agencies	October, 1978.	Porter-Cologne Act; Calif. Health & Safety Code Section 6950 et seq.	Undetermined	Undetermined	Service fees; "201", State Clean Water grants; maintenance districts.	RWQCB can require public management of new developments.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<p>Impacts same as noted for Policy 11.</p>	<p><u>Financial</u></p> <p>Direct Public Costs of Implementation</p> <p>(1979) \$20,000 (First year administrative costs of standard revision)</p> <p>(1980-2000) \$10,000/year (Annual standard revision)</p> <p>(1980) \$45,000 (Cost to revise codes and ordinances - regional total or \$450/jurisdiction)</p> <p>Fiscal Effects on Local Governments</p> <ul style="list-style-type: none"> o No impact. <p><u>Institutional</u></p> <ul style="list-style-type: none"> o Existing ordinances, codes, regulations would need to be modified or amended. o Requires cooperation of numerous local and regional authorities. 	<p><u>Income and Investment</u></p> <ul style="list-style-type: none"> o Profits of firms bearing costs of meeting updated standards should not be affected assuming costs can and will be passed on to the consumer (industry-dependent response). <p><u>Consumer Expenditures</u></p> <ul style="list-style-type: none"> o Indirect increased prices of homes may result from increased costs to meet new requirements. 	<p><u>Health and Safety</u></p> <ul style="list-style-type: none"> o Standard enforcement should decrease development on unstable land and in flood plains. <p><u>Urban Patterns</u></p> <ul style="list-style-type: none"> o Would tend to discourage developments with marginal on-site systems in favor of sewered areas. <p>Other social impacts are the same as noted for Policy 11.</p>
<p><u>Physical Resources</u></p> <ul style="list-style-type: none"> o Indirect impacts on solid waste management practices-land fill capacities and alternative sludge disposal practices. <p>Other environmental impacts are the same as noted for Policy 11.</p>	<p><u>Financial</u></p> <p>Direct Public Costs of Implementation</p> <p>(1978-2000) \$45,000/Management Agency/year</p> <p>(Example of Administrative/Regulatory costs for one year to inspect and monitor an area with 1000 septic tanks)</p> <p>Fiscal Effects on Local Government</p> <ul style="list-style-type: none"> o Impacts on fiscal resources would depend on choice of financing mechanism. If financed by annual assessments, based on assessed value, the property tax rate in the management zone would increase. o An example charge per household for monitoring and maintenance is \$150/year (Stinson Beach). <p><u>Institutional</u></p> <ul style="list-style-type: none"> o Direct impacts on legal capabilities may require creation of special districts or new service areas; expansion of responsibilities of existing agencies or districts; modifications to rules, regulations, and ordinances. o Direct impacts on intergovernmental responsibilities and coordination due to required cooperation of county health departments, RWQCB, zoning authorities, LAFCOs, service districts-may be mitigated by formal cooperative agreements, memoranda of understanding. 	<p><u>Production of Goods and Services</u></p> <ul style="list-style-type: none"> o Employment - increased job opportunities may result if inspection services are contracted to private firms or individuals, new jobs may result in pumpout businesses and equipment supply firms. o Increased demands for maintenance services may result in new firms entering the market. <p><u>Consumer Expenditures</u></p> <ul style="list-style-type: none"> o Annual costs to homeowners would be higher than for homeowners not providing periodic inspection and maintenance. <p>Other economic impacts are the same as noted for Policy 11.</p>	<p><u>Housing Supply</u></p> <ul style="list-style-type: none"> o Costs of new housing may increase due to supply effects, cost to meet new standards and inspection service charges. <p>Other social impacts are the same as noted for Policy 11.</p>

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 11.3 Establish procedure for inspection and maintenance of existing on-site systems where appropriate.	Public management and procedures for establishment determined by California Health & Safety Code, Section 6950 et. seq.	Local governments.	As needed.	Calif. Health and Safety Code Section 6950 et seq.	Undetermined	Undetermined	Service fees "201", State Clean Water grants; maintenance districts	RWQCB can issue waste discharge permits for on-site systems.
Action 11.4 Where on-site systems are inappropriate--install sewerage system.	County Health Dept. survey identifying problems leads to RWQCB cease and desist order and need for sewers. New developments not meeting updated standards for on-site would automatically need sewers. Inappropriate means technically unsuitable for permanent use on proposed or existing lot size.	Local sewerage agencies.	On-going.	Porter-Cologne Act.	Undetermined	Undetermined	System financed via "201", State Clean Water grants, local bonds, assessments, service charges, property taxes, etc.	RWQCB cease and desist order. Health Department can force evacuation of dwellings.
Action 11.5 Promote research of on-site disposal systems.	To improve on-site systems, develop new design and construction criteria and develop new systems.	Governor's Office of Appropriate Technology, private industry.	On-going.	California Government Code 65025 et seq.	Undetermined	Undetermined	State funds, perhaps Federal subsidies; private funds.	Voluntary.
Action 11.6 Revise State grant programs to ensure consideration for funding on-site systems.	To increase the number of on-site system and maintenance district components eligible for funding.	SWRCB	On-going.	P. L. 92-500, Porter-Cologne Act. P. L. 95-217.	-0-	-0-	"201", State Clean Water grants program.	

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<p><u>Physical Resources</u></p> <ul style="list-style-type: none"> o Indirect impacts on solid waste management practices-land fill capacities and alternative sludge disposal practices (e.g., pumpout of 1700 onsite systems may produce 9600 gallons of septage to be disposed of every week. o Treatment prior to disposal could be a problem as treatment facilities near unsewered areas may not be able to handle increased volumes and concentration levels of septage. o In some cases, functioning onsite systems may reduce need to expand sewage treatment plant capacity. <p>Other environmental impacts are the same as noted for Policy 11.</p>	<p><u>Financial</u></p> <p>Direct Public Costs of Implementation</p> <p>\$175,000 (First year costs to locate and inspect 5000 onsite systems which is average number per county based on 1970 census data) - approximate.</p> <p>\$76,000/year (Annual cost to monitor and inspect 1700 onsite systems beginning in year 2 and allowing for 100 new systems/year) - approximate.</p> <p>Fiscal Effects on Local Government</p> <ul style="list-style-type: none"> o Impact on fiscal resources would depend on choice of financing mechanism. Costs of first year effort would probably require direct grants. o An example annual charge: \$150/yr. (Stinson Beach) per residence. 	<p>Impacts same as noted for Action 11.2.</p>	<p><u>Housing Supply</u></p> <ul style="list-style-type: none"> o Existing housing rehabilitation and maintenance costs may increase (example costs: system reconstruction-\$1300, modification for pump-out access - \$260, pumpout costs - \$50-65). <p>Other social impacts are the same as noted for Policy 11.</p>
<p>See Impact Assessment for Municipal Element. A project's inclusion on the 20 year project list does not absolve the potential grantee from EIR/EIS requirements for funding under the Federal Water Pollution Control Act Amendments and the Clean Water Grants programs.</p>			
<p>Impacts same as noted for Policy 11.</p>	<p><u>Financial</u></p> <p>Direct Public Costs of Implementation</p> <p>Office of Appropriate Technology-on-going research funds.</p> <p><u>Institutional</u></p> <ul style="list-style-type: none"> o No impacts. 	<p>Impacts same as noted for Policy 11.</p>	<p>Impacts same as noted for Policy 11.</p>
<p>Assessment should be part of any amendment process of the Federal and State grants programs. In general, if construction of publically managed onsite disposal system is subsidized by Federal and State grant monies, one effect is to return taxpayers monies without bias toward any one method of treatment. Where such grant provision subsidizes second home developments, certain sectors of the population are disproportionately benefited. Payment for operation and maintenance costs would not be altered by grant amendments (i.e. they would continue to be paid for by user charges of one type or another). Note that eligibility amendments would result in reassessment of the 20-year project list as a part of the Continuing Planning Process.</p>			

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 12								
MONITOR EFFECTIVENESS OF EXISTING ARRANGEMENTS FOR PREVENTING AND DEALING WITH OIL AND CHEMICAL SPILLS IN BAY AREA.								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Water Quality</u> <ul style="list-style-type: none"> o Reduced incidence of water pollution from hazardous materials spills. o Reduced incidences of impairment of beneficial uses of bay waters. <u>Physical Resources</u> <ul style="list-style-type: none"> o Reduced incidence of spills and improved spill clean-up would protect: <ul style="list-style-type: none"> - aquatic community - flora and fauna-wildlife habitats (marshes, salt ponds) - water-related recreation use and potential o Impacts on solid waste management may result: <ul style="list-style-type: none"> - spill clean-up often requires disposal in Class I sites (See Hazardous Waste Element of Solid Waste Management Plan) <u>Energy</u> <ul style="list-style-type: none"> o No impacts. <u>Amenities</u> <ul style="list-style-type: none"> o Indirect visual amenity benefits associated with reduced incidence of oil spills and improved containment and disposal. 	<u>Financial</u> <p>Direct Public Costs of Implementation</p> <ul style="list-style-type: none"> o See below <p>Fiscal Effects on Local Governments</p> <ul style="list-style-type: none"> o Local spill prevention and clean-up programs may require commitment of local fiscal resources. <u>Institutional</u> <ul style="list-style-type: none"> o Direct impacts on intergovernmental responsibility and coordination - requires cooperation of numerous Federal, State, regional and local agencies. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment- Public and private sector job opportunities may result from improved enforcement and new requirements. <u>Income and Investment</u> <ul style="list-style-type: none"> o New requirements and enforcement of spill prevention programs may require private capital investments. o Profits of firms bearing costs of new requirements or improved enforcement should not be affected, assuming costs will be passed on to the consumer. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Increased prices of goods and services (especially petroleum and chemical based products) may result when costs incurred to comply with spill prevention programs are passed on to the consumer. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impact. <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impact. <u>Health and Safety</u> <ul style="list-style-type: none"> o Reduced potential for public exposure to health and safety risks. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impact. <u>Equity</u> <ul style="list-style-type: none"> o No impact. <u>Urban Patterns</u> <ul style="list-style-type: none"> o No impact.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 12.1 Monitor the implementation of new hazardous substances regulation.		ABAG	October 1978		\$5,000	\$5,000	Federal 208 funds.	
Action 12.2 Establish a task force to investigate non-petroleum hazardous chemical spill problems in offshore waters, bays and estuaries of California, and make recommendations.	Task force shall include representatives of the commercial shipping and fishing industry; others knowledgeable of chemical spills and their prevention, as well as public interest groups. Study to concentrate on spills of chemicals other than petroleum.	SWRCB	October 1979	Porter-Cologne Act.	\$20,000 for one year	\$20,000 for one year	Federal 208 funds; State program funds	SWRCB action
Action 12.3 Investigate cleanup and preventive measures for inland spills of all potentially hazardous or toxic chemicals in the Bay Area and make recommendations for improvement.	A one time study of inland spill prevention and clean-up activities and responsibilities. Further action will depend on results of study.	Independent consultant hired by ABAG.	October 1979		\$80,000 for one year	\$80,000 for one year	Federal 208 funds	Voluntary.
Action 12.4 Develop local roadway and railbed spill containment and cleanup capabilities. (This Action could include part of Action 13.4 of the Solid Waste Management Plan.	Local fire departments would prepare plans for dealing with a variety of spilled chemicals.	Local fire departments; County Offices of Emergency Services	By December, 1978.	Local government enabling legislation.	Undetermined	Undetermined	Local funds.	Voluntary.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 12.	<u>Financial</u> Direct Public Cost of Implementation (1978-79) \$5,000. Other impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.
Impacts same as noted for Policy 12.	<u>Financial</u> Direct Public Costs of Implementation (1979) \$20,000 for one year only. <u>Institutional</u> o Report may recommend statutory changes, new regulations.	Impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.
Impacts same as noted for Policy 12.	<u>Financial</u> Direct Public Cost of Implementation (1979) \$80,000 for one year only. Other impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.
Impacts same as noted for Policy 12.	<u>Financial</u> Direct Public Costs of Implementation Costs of training programs depend on duration of the classes, number of individuals selected for training, type of program. Fiscal Effect on Local Government o Local fiscal resources may be required to finance program development and training (cost/ fire department). <u>Institutional</u> o Temporary impacts associated with fire department staff time for program development and training.	Impacts same as noted for Policy 12.	Impacts same as noted for Policy 12.

WATER QUALITY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Action 12.5

Reevaluate need to upgrade vessel traffic system in Carquinez Strait and N. San Pablo Bay.

A report would be prepared examining the addition of high-resolution radar coverage to the subject areas.

U.S. Coast Guard.

By June, 1979.

Ports and Waterways Safety Act of 1972.

\$1,000

\$1,000

Federal funds. Voluntary.

Action 12.6

Unless preempted by Federal law, enact State legislation to increase liability of spillers and compensate for oil spill damage.

Bills introduced in the 1977-78 Regular Session of the State Legislature include SB536 and SB841.

U.S. Congress.

On-going.

U.S. Constitution.

Undetermined

Undetermined

Voluntary.

Action 12.7

Promulgate final Federal regulations proposing improvements in requirements for navigational aids and tanker construction.

Proposed DOT standards issued 13 May '77 include:

- o Double bottoms on new large tankers.
- o Segregated ballast on new large tankers.
- o Inert gas systems on all crude oil tankers.
- o Backup radar systems with collision avoidance equipment on all large tankers.
- o Improved emergency steering standards for all tankers.

U.S. Department of Transportation, U.S. Congress.

On-going.

Ports and Waterways Safety Act of 1972.

Undetermined (if proposed standards are finalized, the initial construction cost to bring U.S. vessels up to standards estimated to be \$120,000,000).

Undetermined

Local funds supplemented by State and Federal Grants.

Also S.682

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Water Quality</u> <ul style="list-style-type: none"> o Reduced tanker accidents expected from traffic system should benefit water quality if radar system is recommended. o Reduced chances of impaired uses of San Pablo Bay and Carquinez Straits if radar system is added. <u>Physical Resources</u> <ul style="list-style-type: none"> o Reduced potential for spills from tanker accidents should reduce risks to physical resources. Example of resources which could be impacted: wildlife refuges, water-flow management areas, habitats of rare and endangered species, anadromous fish migration routes, other fish and shellfish resources, water-related recreation resources. <u>Energy</u> <ul style="list-style-type: none"> o No impacts. (Energy required to operate additions to radar system would be small increment.) 	<u>Financial</u> <p>Direct Cost of Implementation</p> <p>(1979) \$10,000 (Cost to prepare a report on the cost-effectiveness of additional radar facility)</p> <p>Fiscal Effects on Local Governments</p> <ul style="list-style-type: none"> o No impacts. <u>Institutional</u> <ul style="list-style-type: none"> o No impact. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment- Minor short-term increase. <u>Income and Investment</u> <ul style="list-style-type: none"> o No impact. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impact. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o No impact <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impact. <u>Health and Safety</u> <ul style="list-style-type: none"> o No impact. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impact. <u>Equity</u> <ul style="list-style-type: none"> o No impact. <u>Urban Patterns</u> <ul style="list-style-type: none"> o No impact.

Impacts same as noted for Policy 12.

Impacts same as noted for Policy 12.

Consumer Expenditures

- o New requirements will result in increased prices of consumer products.

Other economic impacts are the same as noted for Policy 12.

Impacts same as noted for Policy 12.

Specific impacts of Federal and State legislation and regulations must be assessed by responsible Federal and State agencies, as well as legislative bodies.

Section-G

BENEFITS AND COSTS OF PLAN RECOMMENDATIONS

The costs and benefits resulting from each action recommended in the plan are shown in Table 5. They are organized by four impact categories; environmental, institutional/financial, economic and social. This section summarizes the contents of the table and provides a broad overview of the costs and benefits of the water quality management plan.

Environmental Impacts

The principal benefit of carrying out the plan would be an improvement in water quality in the region's streams and lakes. The more obvious pollution problems such as oxygen depletion in the South Bay and in sloughs receiving waste discharge will be eliminated or greatly reduced. Surface runoff and vessel discharge controls together with the ongoing municipal and industrial wastewater facilities construction program would result in improved bacteriological quality of shellfish. Recreational and possibly commercial shellfishing could be reestablished in San Francisco Bay. It is estimated the shellfishery resource can provide 400,000 clamming days per year. Surface runoff controls would reduce the quantity of litter, oil and grease and other debris discharged to receiving waters during storms with a consequent improvement in the appearance of shorelines, streambanks and waters. Soil erosion and siltation of streams and reservoirs would also be reduced. Improved management of on-site wastewater disposal systems would reduce localized bacteriological pollution as a result of failing septic tank systems.

The overall air quality impacts associated with the water quality management recommendations are not considered to be significant. Air quality impacts resulting from the secondary growth effects of treatment facility construction has often been a major concern. The twenty year project list included in this plan includes those facilities necessary to accommodate growth planned for and should not induce growth. While localized increases in carbon monoxide levels may result as growth is accommodated, timing and sizing decisions consistent with the entire EMP should not result in substantial air quality deterioration.

Some short-term localized environmental impacts such as increased noise and dust levels will result from construction activities associated with the plan recommendations. Operation of expanded municipal and industrial wastewater facilities employing higher levels of treatment would result in increased sludge volumes which must be disposed of. Handling the increased sludge volume is dealt with in the solid waste management plan.

Institutional/Financial Impacts

The direct public costs of carrying out the plan recommendations are considerable. Only a small part of the total cost is directly attributable to this plan. This is because construction of new municipal and

industrial wastewater treatment facilities, which is the most expensive recommendation to carry out, is required under State and Federal law. Construction and operation of these new facilities are expected to cost \$200 to \$240 million per year for the next twenty years. Some of the public costs will be paid for by Federal and State grants. The remainder will have to be financed through local revenue sources such as user charges, connection fees, property and other taxes.

In some cases local governments would save money as a result of plan recommendations. For example, controlling erosion could reduce the millions of dollars spent annually to remove accumulated silt in reservoirs. Centralizing arrangements for monitoring the effects of waste discharges on the receiving waters could also lead to cost savings.

The plan recommendations can be carried out using existing institutional arrangements. Joint Powers Agreements, Memoranda of Understanding and inter-agency task forces and committees would aid in successful implementation. No new "super" planning or regulatory agency is recommended.

Economic Impacts

Plan recommendations could affect the job market and the cost of products and services.

Construction of the industrial wastewater treatment facilities and the municipal facilities contained in the twenty-year project list would generate approximately 50,000 temporary jobs during the next twenty years. One thousand to 1500 permanent jobs associated with operation and maintenance of the new facilities would also be created. The recommendations pertaining to vessel discharges and on-site wastewater disposal practices will generate a relatively small number of temporary and permanent jobs.

The cost of wastewater treatment for both industries that discharge directly to the environment and those that discharge to a municipal sewage collection system would increase by at least \$45 million per year. The effects of these increased pollution control costs on industrial production vary widely from industry-to-industry and are difficult to determine. Water pollution control costs are still only a small fraction of total industrial costs and are imposed fairly uniformly across the nation. The plan recommendations do not put Bay Area industry at a competitive disadvantage.

The prices of some goods and services may increase if firms bearing the cost of pollution controls pass on some portion of the cost to the consumer. For example, the costs of mooring and services at marinas may increase to offset the cost of providing pumpout facilities. In general price increases are expected to be slight, however.

The value of recreational clam digging that could be reestablished as a result of plan recommendations is difficult to estimate but is thought to be around \$3 million per year. If a commercial oyster fishery were established it is estimated to be worth \$20 to \$25 million per year.

Social Impacts

The treatment facilities on the 20 year project list would accommodate approximately 700,000 to 900,000 new housing units by the year 2000.

Because the housing industry is particularly sensitive to diversion of investment funds, the capital investments required for recommended water pollution controls may effect the supply and thus the costs of housing. The recommended new standards and criteria for use of on-site disposal systems may preclude their use in certain areas or require larger lots which would affect the supply and costs of housing in semi-rural areas. Certain of the surface runoff controls may slightly increase the costs of new housing, assuming that any added site preparation costs would be passed on to the home buyer.

The plan recommendations are not expected to have significant effects on urban patterns. Localized effects can be expected as a result of some actions such as those dealing with on-site waste disposal systems. Provided the timing and sizing of facilities is consistent with the adopted plan, growth will occur as planned for and should not be induced by the provision of treatment facilities and the use of on-site disposal systems.

The impacts on special population groups (the aged, youth, minorities, low and moderate income individuals) will vary and will largely be a function of the financial and economic impacts. As the plan recommendations are carried out, analysis will be necessary to determine if financing mechanisms chosen will differentially impact special population groups. It will be necessary to determine whether such groups benefit from jobs created or are affected by job losses and how the effects on housing costs will impact their ability to afford adequate housing.

Section-H

BENEFICIAL USES AND WATER QUALITY OBJECTIVES

BENEFICIAL USES

The following definitions for beneficial uses are applicable throughout the entire state.

Municipal and Domestic Supply (MUN)- Includes usual uses in community or military water systems and domestic uses from individual water systems.

Agricultural Supply (AGR)- Includes crops, orchard and pasture irrigation, stock watering, support of vegetation for range grazing and all uses in support of farming and ranching operations.

Industrial Process Supply (PROC)- Includes process water supply and all uses related to the manufacturing of products.

Industrial Service Supply (IND)- Includes uses that do not depend primarily on water quality such as mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Groundwater Recharge (GWR)- Natural or artificial recharge for future extraction for beneficial uses and to maintain salt balance or halt salt water intrusion into freshwater aquifers.

Freshwater Replenishment (FRSH)- Provides a source of freshwater for replenishment of inland lakes and streams of varying salinities.

Navigation (NAV)- Includes commercial and naval shipping.

Water Contact Recreation (REC-1)- Includes all recreational uses involving actual body contact with water, such as swimming, wading, water-skiing, skindiving, surfing, sport fishing, uses in therapeutic spas, and other uses where ingestion of water is reasonably possible.

Non-Contact Water Recreation (REC-2)- Recreational uses that involve the presence of water but do not require contact with water, such as picnicking, sunbathing, hiking, beachcombing, camping, pleasure boating, tidepool and marine life study, hunting and aesthetic enjoyment in conjunction with the above activities as well as sightseeing.

Ocean Commercial and Sport Fishing (COMM)- The commercial collection of various types of fish and shellfish, including those taken for bait purposes, and sport fishing in oceans, bays, estuaries and similar non-freshwater areas.

Warm Freshwater Habitat (WARM)- Provides a warm water habitat to sustain aquatic resources associated with a warm water environment.

Cold Freshwater Habitat (COLD)- Provides a cold water habitat to sustain aquatic resources associated with a cold water environment.

Preservation of Areas of Special Biological Significance (ASBS)- Area of Special Biological Significance are those areas designated by the State Water Resources Control Board as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

Saline Water Habitat (SAL)- Provides an inland saline water habitat for aquatic life resources. Soda Lake in the Central Basin is a saline habitat typical of desert lakes in inland sinks.

Wildlife Habitat (WILD)- Provides a water supply and vegetative habitat for the maintenance of wildlife.

Preservation of Rare and Endangered Species (RARE)- Provides an aquatic habitat necessary, at least in part, for the survival of certain species established as being rare and endangered species.

Marine Habitat (MAR)- Provides for the preservation of the marine ecosystem including the propagation and sustenance of fish, shellfish, marine mammals, water fowl and vegetation such as kelp.

Fish Migration (MIGR)- Provides a migration route and temporary aquatic environment for anadromous or other fish species.

Fish Spawning (SPWN)- Provides a high quality aquatic habitat especially suitable for fish spawning.

Shellfish Harvesting (SHELL)- The collection of shellfish such as clams, oysters, abalone, shrimp, crab and lobster for either commercial or sport purposes.

Hydropower Generation (POW)- Used for hydropower generation. No such sites are presently located in San Francisco Bay Basin.

PRESENT AND POTENTIAL BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Therefore, all water resources must be protected from the pollution and nuisance that may occur as a result of waste discharges. Beneficial uses of surface waters, groundwaters, and coastal waters presented here serve as a basis for establishing water quality standards and discharge prohibitions to attain this goal.

It is believed that the list of beneficial uses in Table 6 accurately reflects future demands on the water resources of the basin. Beneficial uses presented here were selected by the basin plan environmental planning staff and presented

at a public workshop to permit additional input from the public and various agencies interested in water quality control. Anticipated future beneficial uses of water in the Basin are also included; however, these uses may vary for any given body of water depending upon future population needs, land use and water resource development.

Surface Waters

Over 100 water bodies (in the case of the Bay system receiving water segments) were considered for which beneficial water uses are enumerated. Since most freshwater rivers or streams in the basin are insufficient in volume to serve as principal municipal and industrial supplies, these demands are met largely by freshwaters imported from outside the basin. Surface waters of the Bay proper, however, are used extensively by industry largely for cooling purposes. In general, each body of surface water possesses the potential to accommodate most of the designated beneficial uses. The specific beneficial uses for inland streams include: municipal and domestic supply, agricultural supply, industrial process supply, groundwater recharge, water contact recreation, noncontact water recreation, wildlife habitat, cold freshwater habitat, warm freshwater habitat, fish migration and fish spawning. Similar uses are also made of Lower San Joaquin and Delta waters. The remaining surface waters of the Bay and ocean include all of the above except freshwater habitat as a beneficial use and in addition incorporate industrial service supply and navigation as beneficial uses.

With increasing environmental awareness, the requirement to preserve and enhance natural conditions becomes more evident. The Bay, lakes and streams are pleasant to view, particularly in those areas which are readily accessible. Thus, aesthetic enjoyment of surface water has been included in the definition of non-water contact recreation (REC-2).

Groundwaters

Present and potential beneficial uses applicable to all groundwater basins shown in Figure 5 are municipal supply, industrial process water supply and agricultural uses.

Coastal Waters

Beneficial uses of coastal waters are included with remaining surface waters in the Basin in Table 6. Identified as receiving water segment 97 in the table, coastal waters include such beneficial uses as water contact recreation, non-water contact recreation, industrial service supply, navigation, marine habitat, shellfish harvesting, ocean commercial and sport fishing, areas of special biological significance and preservation of rare and endangered species. The California coastline within San Francisco Bay Basin is endowed with exceptional scenic beauty contributing significantly to the natural environment known as the San Francisco Bay area.

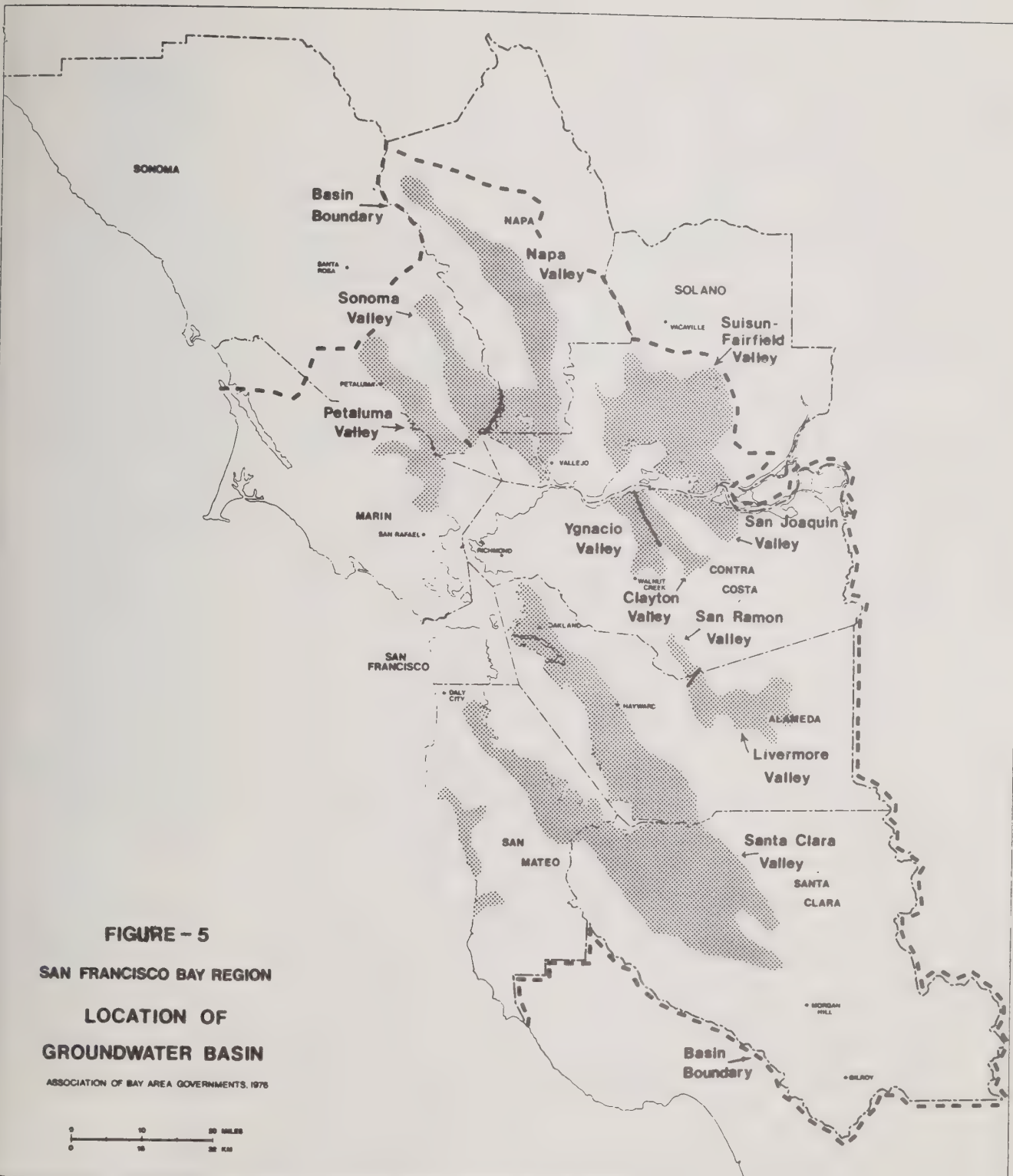


Table - 6
Beneficial uses of surface waters

SURFACE WATERS		MUN	AGR	IND	PROC	GWR	FRSH	NAV	POW	REC1	REC2	COMM	WARM	COLD	ASBS	SAL	WILD	RARE	MAR	MIGR	SPWN	SHELL
1	Merced Lake	○									●			●			●					
2	Crystal Springs Lakes	●									●		●	●			●	●				
3	San Mateo Creek						●			○	○			○			●	●				
4	Pilarcitos Lake	●									○			●			●	●				
5	Pilarcitos Creek	●	●							○	○			●			●	●		●	●	
6	San Andreas Lake	●									●		●	●			●	●				
7	San Vicente Creek		●							○	○			●			●	●		●	●	
8	Denniston Creek		●							●	●		●	●			●	●		●	●	
9	Frenchmans Creek		●							●	●			●			●	●		●	●	
10	Purisima Creek		●							●	●			●			●	●		●	●	
11	Lobitas Creek		●							●	●			●			●	●		●	●	
12	Tunitas Creek		●							○	○			●			●	●		●	●	
13	San Gregorio Creek		●							●	●		●	●			●	●		●	●	
14	Pescadero Creek		●							●	●			●			●	●		●	●	
15	Searsville Lake		●							●	●		●	●			●					
16	Felt Lake		●							●	●		●	●			●					
17	San Francisquito Creek									○	○		●	●			●			●	●	
18	Stevens Creek Reservoir	●				●					●		●	●			●			●	●	
19	Stevens Creek						●			●	●		●	●			●			●	○	
20	Calero Reservoir	●								●	●		●				●					
21	Almaden Reservoir	●				●				●	●		●				●					
22	Guadalupe Reservoir	●				●				○	○		●				●					
23	Lake Elsman	●									○			●			●					
24	Campbell Percolation Ponds					●							●	●			●					
25	Lexington Reservoir	●								●	●		●	●			●					
26	Vasona Reservoir					●				●	●		●	●			●					
27	Cotton Wood Lake									●	●		●	●			●					
28	Los Gatos Creek	■				●	●				○			●			●			○	○	
29	Sandy Wool Lake										●		●	●			●			○	○	
30	Guadalupe River									○	●		●				●			○	○	
31	San Felipe Creek									○	○		●	○			●					
32	Coyote Reservoir	●	●							○	○		●	●			●					
33	Anderson Reservoir	●				●				●	●		●	●			●					
34	Cherry Flat Reservoir	●	●							○	○		●	●			●				●	
35	Coyote Creek									○	●		●	●			●	●		●	●	
36	Arroyo De La Laguna ¹					●				●	●		○	○			●			●	●	
37	Shadow Cliffs Reservoir									●	●		●	●			●			●	●	
38	Arroyo Del Valle ¹	●				●				○	○			●			●			○		
39	Del Valle Reservoir	●								●	●		●	●			●			○	○	
40	Alameda Creek		●			●				●	●		●	●			●			○	○	
41	Elizabeth Lake									●	●		●	●			●					
42	Arroyo Hondo	●					●			●	●		●	●			●				●	
43	Calaveras Reservoir	●									○		●	○			●					
44	San Antonio Reservoir	●									○		●	●			●					
45	Cull Canyon Reservoir									●	●		●	○			●					
46	San Lorenzo Creek ¹									●	●		●	●			●			●	●	
47	San Leandro Reservoir	●									○		●	●			●					
48	Lake Chabot	●									●		●	●			●					
49	San Leandro Creek						●			○	○		○	●			●			○	○	
50	Lake Temescal									●	●		●	●			●					
51	Lake Merritt									●	●		●	●			●					
52	Briones Reservoir	●								○	○		●	○			●					
53	San Pablo Reservoir	●								●	●		●	●			●					
54	Lafayette Reservoir	●								●	●		●	●			●					
55	Pinole Creek									○	○		●	●			●			●	●	
56	Walnut Creek ¹									○	○		●	●			●					
57	Mallard Reservoir ²	●	●	●	●					○	○		●				●					
58	Marsh Creek									○	○		●				●	●				
59	Marsh Creek Reservoir									○	○		●				●	●				
60	Contra Loma Reservoir ²	●	●	●	●						●		●	●			●					
61	Lake Curry	●									○		●				●					
62	Lake Madigan	●	●								●		●	●			●					

Existing and Potential Beneficial Uses of Surface Waters (continued)

SURFACE WATERS		MUN	AGR	IND	PROC	GWR	FRSH	NAV	POW	REC1	REC2	COMM	WARM	COLD	ASBS	SAL	WILD	RARE	MAR	MIGR	SPWN	SHELL
63	Lake Frey	●									●		●				●					
64	Suisun Creek									○	○		●	●			●			●	●	
65	Suisun Slough									●	●		●				●					
66	Montezuma Slough									●	●		●				●	●				
67	Lake Herman	●									○		●	●			●					
68	Chiles Creek	●					●			○	○		●	●			●					
69	Sage Creek	●					●			○	○		●	●			●					
70	Lake Hennessey	●									●		●	●			●				●	
71	Conn Creek	●					●			●	●		●	●			●			●	●	
72	Rector Reservoir	●									●		●	●			●					
73	Milliken Reservoir	●									○		●				●					
74	Lake Marie	●	●							○	○		○				●					
75	Lake Chabot	●	●								●		●	●			●					
76	Dry Creek	●	●							●	●		●	●			●			●	●	
77	York Creek									○	○			●			●			●	●	
78	Napa River	●	●					●		●	●		●	●			●	●		●	●	
79	Sonoma Creek									●	●		●	●			●	●		●	●	
80	Petaluma River							●			●		●	●			●	●		●	●	
81	San Antonio Creek									○	○		●	●			●			○	○	
82	Stafford Lake	●									●		●	○			●				○	
83	Novato Creek	●								○	○		○	○			●			○	○	
84	Rodeo Lagoon									●	●		●	●			●					
85	Miller Creek									○	○		●	●			●	■		○	○	
86	Lake Lagunitas	●									●		●	●			●					
87	Bon Tempe Lake	●									●		●	●			●					
88	Alpine Lake	●									●		●	●			●					
89	Kent Lake	●									●		●	●			●					
90	Lagunitas Creek									●	●			●			●	●		●	●	
91	Phoenix Lake	●									○		●	●			●				●	
92	Nicasio Creek	●					●			●	●			●			●			●	●	
93	Nicasio Reservoir	●					●				○		●				●					
94	Olema Creek									●	●			●			●			●	●	
95	Walker Creek									○	○			●			●	■		●	●	
96	Crystal Lake									○	○		●				●					
97	Pacific Ocean			●				●		●	●	●			●	●		●	●	●	●	●
98	South Bay			●				●		●	●	●					●	●	●	●	○	●
99	Lower Bay			●				●		●	●	●					●	●	●	●	○	●
100	Central Bay			●	●			●		●	●	●					●	●	●	●	●	●
101	San Pablo Bay			●				●		●	●	●					●	●	●	●	●	●
102	Suisun Bay & Lower San Joaquin			●	●			●		●	●	●					●	●	●	●	●	
103	Delta			●	●			●		●	●	●	●				●	●		●	●	
104	Bolinas Lagoon									●	●	●			●		●	●	●	●	●	●
105	Drakes Estero									●	●	●			●		●	●	●	●	●	●
106	Limantour Estero									●	●	●			●		●	●	●	●	●	●
107	Tomaes Bay									●	●	●			●		●	●	●	●	●	●
108	San Pedro Creek										●		●	●			●			●	●	
109	Pomponio Creek		●							○	●			●			●	●			●	
110	Corte Madera Creek									○	●			●			●	●				
111	Old Mill Creek										●			●			●					
112	Pine Gulch Creek	●									●			●			●			●	●	
113	Kimball Reservoir	●									○		●				●					

NOTES:

1. Includes Upstream Tributaries.
2. Offstream Reservoir.
- Potential Beneficial Use.
- Existing Beneficial Use.

WATER QUALITY OBJECTIVES

INTRODUCTION

Section 13241, Division 7 of the California Water Code, specifies that each Regional Water Quality Control Board shall establish water quality objectives which, in the Regional Board's judgment, are necessary for the reasonable protection of beneficial uses and for the prevention of nuisance.

Section 303 of the 1972 Amendments to the Federal Water Pollution Control Act requires the State to submit to the Administrator of the U.S. Environmental Protection Agency for this approval, all new or revised water quality standards which are established for surface and ocean waters. Under federal terminology, water quality standards consist of the beneficial uses enumerated in Table 6 and the water quality objectives contained in this section.

The water quality objectives contained herein are designed to satisfy all state and federal requirements.

As new information becomes available, the Regional Board will review the appropriateness of the objectives contained here. These objectives will be subject to public hearing at least once during each three-year period following adoption of this plan for the purpose of review and modification as appropriate.

EXISTING STATEWIDE PLANS AND POLICIES

The State Water Resources Control Board has adopted a "Statement of Policy with Respect to Maintaining High Quality of Waters in California", the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California", the "Water Quality Control Plan for Ocean Waters of California", and the "Water Quality Control Policy for the Enclosed Bays and Estuaries of California". The Regional Board is required to implement the provisions of these plans and policies.

Nondegradation Policy

On October 28, 1968, the State Water Resources Control Board adopted Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California". While requiring the continued maintenance of existing high quality waters, the policy provides conditions under which a change in water quality is allowable. A change must:

- o be consistent with maximum benefit to the people of the State,
- o not unreasonably affect present and anticipated beneficial uses of water, and
- o not result in water quality less than that prescribed in water quality control plans or policies.

Thermal Plan

The "Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California", adopted by the State Water Resources Control Board on May 18, 1972, specifies water quality objectives, effluent quality limits, and discharge prohibitions related to thermal characteristics of interstate waters and waste discharges.

Ocean Plan

The "Water Quality Control Plan for Ocean Waters of California" was adopted by the State Water Resources Control Board on July 6, 1972. This plan establishes beneficial uses and water quality objectives for waters of the Pacific Ocean adjacent to the California Coast outside of enclosed bays, estuaries, and coastal lagoons. Also, the Ocean Plan prescribes effluent quality requirements and management principles for waste discharges and specifies certain waste discharge prohibitions.

The Ocean Plan also provides that the State Water Resources Control Board shall designate Areas of Special Biological Significance and requires wastes to be discharged a sufficient distance from these areas to assure maintenance of natural water quality conditions.

Bays and Estuaries Policy

The "Water Quality Control Policy for the Enclosed Bays and Estuaries of California" adopted by the State Water Resources Control Board on May 16, 1974, provides water quality principles and guidelines for the prevention of water quality degradation and to protect the beneficial uses of waters. Decisions by the Regional Board are required to be consistent with the provisions of this policy. This policy does not apply to wastes from vessels or land runoff except as specifically indicated for siltation and combined sewer flows.

WATER QUALITY OBJECTIVES

The water quality objectives which follow supersede and replace those contained in the "Interim Water Quality Control Plan for the San Francisco Bay Basin" (as updated); the "Water Quality Control Policy for Pacific Ocean, Pescadero Point to Mouth of Tomales Bay, Bolinas Lagoon, Drakes Estero, Limantour Estero, Portions of Tomales Bay, and Tidal Portions of Coastal Streams" (1967); and the "Water Quality Control Policy for Tidal Waters Inland from the Golden Gate within the San Francisco Bay Region" (1967).

Controllable water quality factors shall conform to the water quality objectives contained herein. When other factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, then controllable factors shall not cause any further degradation of water quality.

Controllable water quality factors are those actions, conditions, or circumstances resulting from man's activities that may influence the quality of the waters of the State and that may be reasonably controlled.

These water quality objectives are considered to be necessary to protect those present and probable future beneficial uses enumerated in Table 6 and to protect existing high quality waters of the State. These objectives will be achieved primarily through the establishment of waste discharge requirements and through the implementation of this water quality control plan.

The Regional Board in setting waste discharge requirements will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives. The Regional Board will make a finding as to the beneficial uses to be protected within the area of influence of the discharge and establish waste discharge requirements to protect those uses and to meet water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. Obviously, the same requirements cannot be applied at or immediately adjacent to submerged effluent discharge structures. Allowable zones of dilution within which higher concentrations will be tolerated will be defined for each discharge at the time discharge permits are drafted. Expression of certain water quality objectives in the form of statistical distribution (50 and 90 percentile values) should also be considered when drafting discharge permits.

In the following section the objectives are stated and are followed in some cases by discussion of the background and rationale of the objective.

GENERAL OBJECTIVE

The following objectives shall apply to all waters of the Basin.

Nondegradation

Wherever the existing quality of water is better than the quality of water established herein as objectives, such existing quality shall be maintained unless otherwise provided by the provisions of the State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California", including any revisions thereto.

Objectives for Ocean Waters

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan), and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revisions thereto shall apply.

In addition to the provisions of the Ocean Plan and Thermal Plan, the following objectives shall also apply to all ocean waters of the Basin:

Dissolved Oxygen

The mean annual dissolved oxygen concentration shall not be less than 6.0 mg/l nor shall the minimum dissolved oxygen concentration be reduced below 5.0 mg/l at any time.

pH

The pH value shall not be depressed below 7.0 nor raised above 8.5.

Objectives for Inland Surface Waters, Enclosed Bays, and Estuaries

The following objectives apply to all inland surface waters, enclosed bays and estuaries of the Basin.

Color

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

Tastes and Odors

Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance or adversely affect beneficial uses.

Floating Material

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

Suspended Material

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

Settleable Material

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

Oil and Grease

Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

Biostimulatory Substances

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas of 10 JTU or more; waters of characteristically low natural turbidity shall be maintained so that discharges do not cause visible, aesthetically undesirable contrast with the natural appearance of the water.

pH

The pH shall not be depressed below 6.5 nor raised above 8.5.

Changes in normal ambient pH levels shall not exceed 0.2 units in waters with designated marine (MAR) beneficial uses nor 0.5 units in fresh waters with designated COLD or WARM beneficial uses.

Dissolved Oxygen

For all tidal waters, the following objectives shall apply:

In the Bay downstream of Carquinez Bridge	5.0 mg/l minimum
Upstream from Carquinez Bridge	7.0 mg/l minimum

For nontidal waters, the following objectives shall apply:

Waters designated as cold water habitat	7.0 mg/l minimum
Waters designated as warm water habitat	5.0 mg/l minimum

Areas of Special Biological Significance shall be maintained at a level of protection consistent with natural undegraded conditions uninfluenced by any controllable water quality factor. Where natural factors cause lower concentrations, controllable water quality factors shall not cause further reduction.

All waters designated as aquatic life habitat shall be maintained at Maintenance Level B, unless otherwise designated. In addition to these limiting numerical objectives, the lower ten percentile dissolved oxygen concentration value shall be determined as a function of dissolved oxygen content at saturation, in accordance with Figure 4-1 of the Basin Plan.

Bacteria

In tidal waters designated for contact recreation (REC-1), the total coliform concentration, based on a minimum of not less than five consecutive samples, shall not exceed a median value of 240/100 ml, nor shall any sample exceed a total coliform concentration of 10,000/100 ml. In addition, the fecal coliform concentration, based on a minimum of five consecutive samples, shall not exceed a median value of 50/100 ml, nor shall any sample exceed a maximum fecal coliform concentration of 400/100 ml.

At all areas where shellfish may be harvested for human consumption (SHELL), the median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100 ml nor shall more than 10 percent of the samples collected during any 30-day period exceed 230/100 ml for a five-tube decimal dilution test or 330/100 ml when a three-tube decimal dilution test is used.

In nontidal waters designated for contact recreation (REC 1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.

In nontidal waters designated for noncontact recreation (REC-2) and not designated for contact recreation (REC-1), the average fecal coliform concentration for any 30-day period, shall not exceed 2,000/100 ml nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000/100 ml.

In nontidal waters used for domestic drinking water supply (MUN), the arithmetic average of at least five (5) samples collected over a thirty (30) day interval shall not exceed a total coliform concentration of 100 per 100 ml or a fecal coliform of 20 per 100 ml.

Temperature

Temperature objectives for *Enclosed Bays and Estuaries* are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California" including any revisions thereto.

In addition, the following temperature objectives apply to surface waters:

The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature.

At no time or place shall the temperature of WARM waters be increased more than 5°F above natural receiving water temperature.

Toxicity

All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bio-assays of appropriate duration or other appropriate methods as specified by the Regional Board.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for

the same water body in areas unaffected by the waste discharge or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in *Standard Methods for the Examination of Water and Wastewater*, latest edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bio-assay.

In addition, effluent limits based upon acute bio-assays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

Ammonia

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits:

0.025 mg/l as N	Annual Median
0.4 mg/l as N	Maximum

Pesticides

No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life.

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations set forth in California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Table 4, and listed below:

Pesticides:	mg/l
Aldrin	0.017
Chlordane	0.003
DDT	0.042
Bioleldrin	0.017
Endrin	0.001
Heptachlor	0.018
Heptachlor epoxide	0.018
Lindane	0.056
Methoxychlor	1.0
Organophosphorous and Carbamate compounds (as parathion in cholinesterase inhibition)	0.1
Toxaphene	0.005
Herbicides:	mg/l
2, 4-D plus	
2, 4, 5-T plus	
2, 4, 5-TP	0.1

Total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods prescribed in *Standard Methods for the Examination of Water and Wastewater*, latest edition, or other equivalent methods approved by the Executive Officer.

Sulfide

All waters shall be free from dissolved sulfide concentrations above natural background levels.

Chemical Constituents

Water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in California Administrative Code Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Tables 2, 3, and 4 and listed below:

Inorganic Chemicals

Constituent	Limiting Concentration, mg/l								
Arsenic	0.10
Barium	1.0
Cadmium	0.01
Chromium	0.05
Cyanide	0.2
Lead	0.05
Mercury	0.005
Nitrate-N + Nitrite-N	10
Selenium	0.01

Fluoride Concentration

Annual Average of Maximum Daily Air Temperature*					Fluoride Concentration, mg/l		
					Lower	Optimum	Upper
50-54	.	.	.	.	0.9	1.2	1.7
55-58	.	.	.	.	0.8	1.1	1.5
59-64	.	.	.	.	0.8	1.0	1.3
65-71	.	.	.	.	0.7	0.9	1.2
72-79	.	.	.	.	0.7	0.8	1.0
80-81	.	.	.	.	0.6	0.7	0.8

* Based on temperature data obtained for a minimum of five years.

Organic Chemicals

Constituent	Limiting Concentration mg/l
Carbon-alcohol extract (CAE-m)	3.0
Carbon-chloroform extract (CCE-m)	0.7
Foaming agent (MBAS)	0.5

Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

Note: Standards for quality and quantity of delta outflow as adopted by the State Water Resources Control Board will be adopted as part of this plan when they become available.

Radioactivity

Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.

Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the limits specified in California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Table 5, and listed below:

Radioactivity

[illegible]

Water Quality Objectives for Specific Inland Surface Waters

Alameda Creek Watershed

The following chemical quality limits shall be maintained in the surface waters of the Alameda Creek watershed above Niles:

TDS:	250 mg/l	90 day-arithmetic mean
	360 mg/l	90 day-90th percentile
	500 mg/l	daily maximum

Chlorides:	60 mg/l	90 day-arithmetic mean
	100 mg/l	90 day-90th percentile
	250 mg/l	daily maximum

Whenever natural factors cause the above limits to be exceeded, then, subject to the exception below, controllable water quality factors shall not cause further degradation.

Wastewater discharges that cause the above surface water limits to be exceeded may be allowed if part of an overall water-wastewater resource operational program developed by those agencies affected and approved by the Regional Board. Approval of the program by the Regional Board will be based upon a satisfactory demonstration that the discharge will not impair the beneficial uses of the surface and/or groundwaters.

Other Inland Surface Waters

As part of the State's continuing planning process, data will be collected and numerical water quality objectives will be developed for those mineral and nutrient constituents where sufficient information is presently not available for the establishment of such objectives.

Objectives for Groundwaters

The following objectives apply to all groundwaters of the Basin.

Tastes and Odors

Groundwaters shall not contain taste or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Bacteria

In groundwaters used for domestic or municipal supply (MUN) the median concentration of coliform organisms over any seven-day period shall be less than 2.2/100 ml.

Chemical Constituents

Groundwaters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the limits specified in California Administrative Code Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Tables 2, 3, and 4.

Groundwaters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

Radioactivity

Groundwaters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the limits specified in California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 1, Article 4, Section 7019, Table 5.

Specific Groundwaters

As part of the State's continuing planning process, data will be collected and numerical water quality objectives will be developed for those mineral constituents where sufficient information is presently not available for the establishment of such objectives.

IMPLEMENTATION PLAN

POINT SOURCE MEASURES

Effluent Limitations

In addition to effluent limitations required under Federal law the following limits are set forth for the protection of beneficial uses in the Bay Basin.

Toxicity

Toxicity controls on effluents will be forthcoming from the EPA pursuant to Section 307 of the Federal Water Pollution Control Act as amended in 1972.

Effluent standards based on bioassay data are included for both deep and shallow water discharges. Compliance with these toxicity standards will be achieved as soon as reasonably possible under the facts and circumstances of each discharge in the discretion of the Regional Board."

Deep Water Discharges

The survival of test fishes in 96-hour bioassays of the effluent shall be a 90 percentile value of not less than 50 percent survival. Exceptions to this limitation may be granted and revised toxicity requirements established by the Regional Board, pursuant to public hearing, if the discharger can demonstrate to the satisfaction of the Board that the following conditions are met:

1. The waste is discharged through a deepwater outfall which achieves rapid and high initial dilution and that the waste is rapidly rendered non-acutely toxic upon discharge, and
2. The toxicants in the waste are nonconservative constituents which are rapidly decayed in the receiving water; or the toxicants in the waste are conservative constituents for which water quality objectives have been established. The Regional Board will, in such cases, establish effluent mass emission rates for such constituents.

Shallow Water Discharges

The survival of test fishes in 96-hour bioassays of the effluent shall be a median of 90 percent survival and a 90 percentile value of not less than 70 percent survival.

Wastewater Reuse

Reclamation of wastewater for reuse must include treatment sufficient to achieve those limits prescribed in the California Administrative Code, Title 22, Division 4 Environmental Health, Chapter 4 Reclamation Criteria, Section 560301-60357.

Coliform Bacteria

No waste discharge, wherein effluent volumes comprise 10 percent or more of the receiving water volume (exclusive of previously discharged effluent) at a point of access, shall exceed a most probable number of coliform organisms of 2.2 per 100 ml.

Residual Chlorine

Wastewaters shall not contain residual chlorine upon discharge to surface waters.

Load Allocation to Receiving Water Segments

Thirteen principal receiving water segments are listed in Table 7. Table 8 presents load allocations based upon assimilative capacity of water quality limited receiving water segments.

Table 7 Receiving Water Segments

Receiving water segment	Description	Classification
1	Pacific Ocean	Effluent limited
2	Central San Francisco Bay	Effluent limited
3	San Pablo Bay	Effluent limited
4	Suisun Bay	Effluent limited
5	Lower San Francisco Bay	Effluent limited
6	South Bay	Water quality limited
7	Suisun Marsh	Effluent limited
8	Napa River	Water quality limited
9	Petaluma River	Water quality limited
10	Sonoma Creek	Effluent limited
11	Alameda Creek	Water quality limited
12	Richardson Bay	Effluent limited
13	Tomaes Bay	Effluent limited
Other surface water segments		^a Effluent limited

^a Includes Coyote, Guadalupe, Walnut, Nicasio, and Pescadero creeks, as well as all fresh water impoundments.

Table 8. Assimilative Capacity and Load Allocation
for Water Quality Limited Segments

Water segment	Description	Parameter	Assimilative capacity, ppd	Point Source allocation, ppd
6	South Bay	UOD	140,000	100,000
8	Napa River	UOD	8,000	6,000
9	Petaluma River	UOD	6,000	5,000
11	Alameda Creek	TDS	a	a

^a The concept of assimilative capacity and local allocation is not germane to wastewater management practice.

Wet Weather Overflows

This conceptual approach does not endorse any specific control measures. The concepts which are expressed in the following paragraphs will be used as guidance by the Regional Board in adopting specific control measures for individual discharges.

The approach presented is conceptual and should not be interpreted as rigid numerical objectives. The specified control levels are based on available information and should be evaluated by the Regional Board, and other agencies, prior to the designation of such levels for each local area.

The recommended approach to wet weather overflow control is a combination of designated alternative levels of maintenance and rainfall or overflow frequency information. Higher maintenance levels require greater protection and consequently more restrictive controls. Since degree of protection follows the axioms of probability, it is reasonable to utilize rainfall frequency as a method of defining the various control levels. As overflow problems are a direct result of rainfall the proposed approach is based on a common rainfall intensity frequency analysis procedure.

Rainfall return period (the reciprocal of storm frequency) is utilized to determine the necessary treatment level and capacity for a given alternative level of maintenance. It is proposed that for each maintenance level, treatment requirements be established for all flows generated by specific storms. Maintenance Level A provides essentially complete protection and achievement of the no-overflow goal. This level is appropriate for areas where the aquatic environment should be free of any identifiable risk from the discharge of untreated wastewaters. A significant portion of the Bay does not fall into the highest level of protection due to the multiplicity of uses and demands placed upon the waters. These areas need to be protected from significant impairment by a sound water quality control action. Such areas would include shellfish beds which would be

harvested year-round, public beaches and other water contact areas. For those areas Maintenance Level B may be designated. Maintenance Level C is a condition where water quality or aquatic productivity is limited due to the pollutional effects of a dense human population or other urban activities which are largely uncontrollable.

In areas which warrant Maintenance Level B or C protection, some controlled degradation is allowed; varying treatment levels are recommended at different rainfall return periods. With more intense storms, the levels of treatment may be decreased. It may be argued that for such storms, the water quality situation along shorelines would be drastically changed due to increased flows, turbidity and other physical characteristics and, therefore, the decreased level of treatment may not significantly impair the quality of local waters. Within those areas which require Maintenance Level B, it is recommended that secondary treatment be provided for wastewater flows associated with a 2-year storm. Excess flows up to that generated by a 20-year storm should receive the equivalent of primary treatment with disinfection. Corresponding values for those areas designated as Maintenance Level C would be: secondary treatment for flows generated by the 0.5-year storm (2 storms per year) and primary treatment with disinfection for flows resulting from a 5-year storm. More intense storms would result in untreated overflows. Overflow control criteria for the various maintenance levels are arrayed graphically on Figure 6.

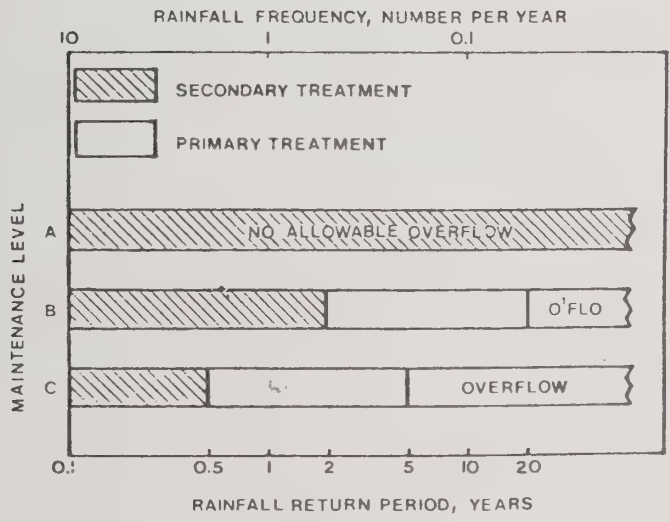


Figure - 6 Overflow Control Criteria for Wastewater Collection Systems

CONTROL ACTIONS

Control Actions Discharge Prohibitions

Selected special considerations are to be applied as discharge regulations over and above constraints established by water quality objectives and effluent limitations. The following provisions are set forth for certain discharges and activities influencing water quality.

It shall be prohibited to discharge:

1. Any wastewater which has particular characteristics of concern to beneficial uses:
 - a. Affecting ocean waters over rocky substrates or within 1,000 feet offshore from the extreme low water line and where the waste will not receive a minimum dilution ratio of 100:1 as it reaches the surface.
 - b. At any point at which the wastewater does not receive a minimum initial dilution of at least 10:1.
 - c. Into any nontidal water or dead-end slough or similar confined water areas or their immediate tributaries.
 - d. To Tomales Bay, Drakes and Limantour Esteros or Bolinas Lagoon. Exceptions to a,b, and c above will be considered for certain wet weather discharges and other discharges having a high initial dilution where an inordinate burden would be placed on the discharger relative to beneficial uses protected and when an equivalent level of environmental protection can be achieved by alternate means. Exceptions will also be considered where a discharge is approved as part of a reclamation project or where it can be demonstrated that environmental benefits will be derived as a result of the discharge.
2. All conservative toxic and deleterious substances above those levels which can be achieved by source control, to waters of the Basin.
3. Floatable rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.
4. Floating oil or other floating materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity or discoloration in surface waters.
5. Silt, sand, clay, or other earthen materials from any activity in quantities sufficient to cause deleterious bottom deposits, turbidity or discoloration in surface waters or to unreasonably affect or threaten to affect beneficial uses.
6. Sludges of municipal or industrial waste origin and sludge digester supernatant centrate, or filtrate directly to surface waters or to a waste stream that discharges to surface waters without further treatment.

7. Biocides of a persistent or cumulative form when applied over waters or near shoreline areas where direct or indirect discharge to water is threatened.
8. Radiological, chemical, or biological warfare agent or high level radioactive waste.
9. Oil or any residuary product of petroleum to the waters of the State, except in accordance with waste discharge requirements or other provisions of Division 7, California Water Code.
10. Any wastewater which has characteristics of concern to beneficial uses in- to San Francisco Bay south of the Dumbarton Bridge. Exceptions will be considered where the discharge is approved as part of a reclamation project or where it can be demonstrated that a net environmental benefit will be derived from such a discharge.
11. Sewage bearing wastewater to individual leaching or percolation systems in the Stinson Beach area of Marin County and the Glen Ellen and Penngrove areas of Sonoma County as specified in Resolution Nos. 73-13 (as amended), 73-14 and 73-19 of the California Regional Water Quality Control Board, San Francisco Bay Region.
12. Untreated sewage to any waters of the basin. Ocean Waters. Discharge prohibitions contained in the State Water Resources Control Board's "Water Quality Control Plan for Ocean Waters of California" shall apply to all affected waters of the basin. Enclosed Bays and Estuaries. Discharge prohibitions contained in the State Water Resources Control Board's "Water Quality Control Policy for Enclosed Bays and Estuaries of California" shall apply to all affected waters of the basin.
13. Sewage bearing wastewater to leaching or percolation systems in the Emerald Lake Hill and Oak Knoll Manor areas of San Mateo County, as specified in Resolution 76-7 of the California Regional Water Quality Control Board, San Francisco Bay Region.

Other Prohibitions

The following discharge prohibitions shall apply:

1. The direct discharge of wastewater shall be prohibited during the dry weather period of the year to the waters of Suisun Marsh.
2. The direct discharge of wastewater shall be prohibited from the portion of Richardson Bay lying between Sausalito Point and Peninsula Point.
3. The direct discharge of wastewater shall be prohibited during the portion of the year when no natural flow occurs in Alameda Creek above Niles.

Section-J

20-YEAR PROJECT LIST OF MUNICIPAL WASTEWATER FACILITIES

Included on this list are projects to meet Bay Area municipal waste treatment needs for the next 22 years. The Federal Water Pollution Control Act Amendments of 1972 require that this list be part of the plan required by Section 208 of that law. After this Environmental Management Plan is approved by the State and the Environmental Protection Agency, Federal law requires that the Administrator of EPA shall not make any grant for construction of publicly owned treatment facilities under Section 201 of the FWPCA, except for those facilities in conformance with the 208 plan.

20-YEAR PROJECT LIST OF
MUNICIPAL WASTEWATER FACILITIES

ALAMEDA COUNTY			Revised May 2, 1978		FISCAL YEAR (AND ASSIGNED STEPS)																										
Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001			
East Bay Municipal Utility District, Special Dist. No. 1	1246	EBMUD wet weather facilities Phase I	1- 2- 2,500,000 3- 40,000,000	II		2		3																							
EBMUD	1246	EBMUD wet weather facilities--stormwater elimination	1- 4,000,000	II	1																										
EBMUD	1246	EBMUD wastewater reclamation facilities	1- 2- 3,500,000 3- 50,000,000	I		2		3																							
EBMUD	1246	EBMUD wet weather facilities-Phase II	1- 2- 2,500,000 3- 50,000,000	II					2		3																				
EBMUD		EBMUD wastewater solids management facility	1- 2- 2,200,000 3- 22,000,000	I		2		3																							
City of Albany		Collection sewers	1- 3,000 2- 12,000 3- 135,000	III				1		2		3																			
City of Oakland		Collection and transport facilities for Skyline and Panoramic Areas	1- 15,600 2- 65,000 3- 1,120,000	III				1		2		3																			
City of Alameda	1576	Interceptor from Bay Farm Island is deteriorated and has had recent failures	1- 3,000 2- 5,000 3- 42,000	III		1		2			3																				
Alameda County		Collection and transport of sewage within unsewered areas of Eden Township and unincorporated canyon areas	1- 15,000 2- 65,000 3- 1,120,000	III				1		2		3																			
City of Hayward	1442	Hayward interceptor sewer	1- 20,000 2- 80,000 3- 1,400,000	III				1				2		3																	
City of San Leandro	1431	Reclamation project	2- 96,000 3- 1,600,000	IV		2																									

^aStep 1 - Facilities planning; Step 2 - Preparation of plans and specifications; Step 3 - Construction.

^bProject groups and priorities as defined by State Water Resources Control Board (SWRCB) Clean Water Grant Program Regulations.

^cIn October, 1977, the Governor signed an Executive Order calling for tripling the amount of water recycled in the State within five years. This Order is likely to result in expediting all of these reclamation and reuse projects and adding other projects to this list. Preliminary analysis indicates that all of these projects scheduled for 78-79 are consistent with the EMP. All other projects will be analyzed on a project by project basis in the continuing planning process.

ALAMEDA COUNTY (Continued)

[illegible]

ALAMEDA COUNTY (Continued)

[illegible]

CONTRA COSTA COUNTY

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	FISCAL YEAR (AND ASSIGNED STEPS)																						
					77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of Point Richmond outfall	3- 8,500,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of Richmond STP miscellaneous improvements	3- 3,500,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of San Pablo effluent pump station	3- 1,600,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of San Pablo to Richmond force main	3- 9,000,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Design of San Pablo wet weather facilities, treatment plant rehabilitation & solids handling	2- 2,500,000	1		2																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of San Pablo STP wet weather facilities and sludge lagoons	3- 18,000,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of San Pablo Treatment Plant modifications	3- 2,000,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Design of Richmond Treatment Plant wet weather facilities plant modification & infiltration/inflow corrections	2- 2,000,000	1		2																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of Richmond STP wet weather facilities	3- 10,000,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of Richmond Treatment Plant modifications	3- 12,000,000	1		3																					
West County Agency Joint Powers Agreement (Richmond-San Pablo)	1154	Construction of Richmond collection system rehabilitation to eliminate excessive infiltration/inflow	3 8,000,000	1		3																					

CONTRA COSTA COUNTY (Continued)

Implementing Agency	Project No. (SHRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	FISCAL YEAR (AND ASSIGNED STEPS)																							
					77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
City of Richmond		Collection system improvements	1- 2- 3- 8,000,000	III																								
West Contra Costa Sanitary District	1443	Wastewater reclamation facilities	1- 2- 240,000 3- 2,000,000	I																								
West Contra Costa Sanitary District		Collection system improvements in El Sobrante	1- 2- 100,000 3- 500,000	III																								
West Contra Costa Sanitary District		Solids disposal and energy recovery facilities	1- 100,000 2- 2,000,000 3- 10,000,000	I																								
City of Pinole	1577	Plant modifications for Pinole-Hercules	1- 2- 3- 300,000	I																								
City of Pinole	1577	Plant expansion	1- 2- 200,000 3- 2,700,000	III																								
City of Pinole	1577	Transport and disposal facilities for Pinole-Hercules	1- 2- 3- 4,000,000	I																								
City of Hercules		Wastewater recycling project testing	1- 2- 90,000 3- 750,000	N/A																								
Rodeo Sanitary District	1164	Rodeo Sanitary District Treatment Plant modifications and outfall extension	1- 2- 3- 2,000,000	I																								
Rodeo Sanitary District		Rodeo Sanitary District plant expansion	1- 50,000 2- 200,000 3- 2,000,000	I																								
Rodeo Sanitary District		Collection sewers improvements and expansion	1- 10,000 2- 40,000 3- 300,000	III																								
Rodeo Sanitary District		Solids handling facilities	1- 20,000 2- 80,000 3- 600,000	III																								

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CONTRA COSTA COUNTY (Continued)

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-73	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000
Mt. View Sanitary District	1241	Facilities necessary to comply with MPDES dechlorination and 10:1 dilution requirements	1- 20,000 2- 100,000 3- 1,000,000	I		1 2																					
Mt. View Sanitary District		Elimination of bypasses and overflows	1- 14,000 2- 31,000 3- 355,000	III				1		2																	
Contra Costa County Sanitary District No. 5	1242	Port Costa upgrading treatment to secondary level	1- 2- 18,000 3- 228,000	I			2																				
Contra Costa County Sanitary District No. 5		Collection sewers	1- 3,000 2- 5,000 3- 42,000	III				1		2																	
Central Contra Costa Sanitary District (C.C.C.S.D.)	1000	C.C.C.S.D. secondary plant expansion	1- 2- 77,000 3- 5,694,000	I			2 3																				
C.C.C.S.D.	1269	C.C.C.S.D. solids disposal and energy recovery facilities - stage 1	1- 2- 1,000,000 3- 15,860,000	I			2																				
C.C.C.S.D.		C.C.C.S.D. solids disposal and energy recovery facilities- stage 2	1- 250,000 2- 2,100,000 3- 32,729,000	I		1			2		3																
C.C.C.S.D.		Sewage collection and transport, treatment and disposal for Orinda	1- 60,000 2- 260,000 3- 5,380,000	III				1		2 3																	
City of Concord		Collection sewers (Stage II)	1- 36,000 2- 181,650 3- 1,816,500	III				1		2																	
City of Concord		Collection sewers (Stage III)	1- 2- 179,800 3- 1,789,500	III						2																	
Contra Costa County Sanitation District No. 7A	1002	C.C.C.S.D. No. 7A subregional facilities	1- 2- 3- 31,000,000	I			3																				
Contra Costa County Sanitation District No. 7A		Collection sewers	1- 14,000 2- 31,000 3- 355,000	III				1		2																	
Contra Costa County Sanitation District No. 7A		Sludge disposal facilities	1- 10,000 2- 30,000 3- 400,000	I			1		2		3																

CONTRA COSTA COUNTY (Continued)

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
Contra Costa County Sanitation District No. 7A		Expansion of secondary treatment and sludge disposal facilities	1- 100,000 2- 3-	III							1																	
											Unscheduled																	
											Unscheduled																	
Contra Costa County Sanitation District No. 7A		Wastewater reclamation facilities	1- 150,000 2- 900,000 3- 14,000,000	IV					1	2			3															
Contra Costa County Sanitation District No. 7A		Relief facilities for conveyance system	1- 100,000 2- 500,000 3- 11,600,000	III													1		2				3					
Oakley Sanitary District-- C.C.C.S.D. No. 15	1416	Oakley Sanitary District plant improvements; transport facilities from C.C.C.S.D. No. 15 (Bethel Island) to Oakley for wastewater treatment	1- 2- 3- 5,500,000	I			3																					
Oakley Sanitary District-- C.C.C.S.D. No. 15		Expansion of secondary treatment and effluent disposal facilities; relief of conveyance system; addition of sludge processing and disposal facilities	1- 30,000 2- 3-	III							1																	
											Unscheduled																	
											Unscheduled																	
City of Brentwood	1415	Brentwood treatment plant expansion	1- 2- 3- 1,000,000	I			3						1															
City of Brentwood		Expansion of secondary treatment and effluent disposal facilities; addition of sludge processing and disposal facilities	1- 15,000 2- 3-	III									1															
											Unscheduled																	
											Unscheduled																	
C.C.C.S.D. No. 19		Evaporation-percolation ponds and flood protection	1- 20,000 2- 200,000 3- 2,200,000	III					1	2	3																	
C.C.C.S.D. No. 19		Expansion of evaporation-percolation ponds	1- 2,000 2- 3-	III									1															
											Unscheduled																	
											Unscheduled																	
Contra Costa County Water District		Expansion of the ion exchange softening plant for reclaimed wastewater (from 15 mgd to 30 mgd)	1- 50,000 2- 150,000 3- 1,300,000	IV			1		2	3																		
Contra Costa County	1514	Facilities plan for countywide septage study	1- 25,000 2- 3-	I		1																						
Contra Costa County		Sand Hill wastewater management facilities	1- 16,000 2- 38,000 3- 446,000	III				1		2	3																	
Contra Costa County		East Contra Costa County treatment facilities expansion	1- 10,000 2- 100,000 3- 1,000,000	I													1		2		3							
C.C.C.S.D.		C.C.C.S.D. secondary plant expansion and upgrading to advanced treatment	1- 48,000 2- 480,000 3- 48,000,000	I							1		2															
														3														

MARIN COUNTY

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-20
Richardson Bay Sanitary District		Collection sewers	1- 8,000 2- 31,000 3- 461,000	I		1																						
City of Sausalito		Collection sewers	1- 3,000 2- 5,000 3- 42,000	III				1		2		3																
City of Mill Valley		Collection sewers	1- 10,000 2- 19,000 3- 201,000	III				1		2		3																
City of Mill Valley	1409	Reclamation facilities	1- 2- 40,000 3- 400,000	I		2	3																					
Homestead Valley Sanitary District		Collection sewers	1- 7,000 2- 13,000 3- 130,000	III				1		2		3																
Marin County Sanitation District No. 1		Collection sewers	1- 30,000 2- 85,000 3- 1,085,000	III				1		2		3																
Las Gallinas Valley Sanitary District and Marin Municipal Water District	1256	Reclamation facilities	1- 2- 3- 1,100,000	I		3																						
Las Gallinas Valley S.D.		Collection sewers	1- 35,000 2- 105,000 3- 1,460,000	III					1	2		3																
Novato Sanitary District	1058	Subregional treatment and transport facilities for South Sonoma/Eastern Marin-Phase I	1- 2- 2,300,000 3- 27,400,000	I		2	3																					
Novato Sanitary District	1058	Subregional treatment and transport facilities for South Sonoma/Eastern Marin - Phase II	1- 2- 2,300,000 3- 27,400,000	I			2	3																				
Novato Sanitary District	1058	Subregional treatment and transport facilities for South Sonoma/Eastern Marin - Phase III	1- 2- 2,400,000 3- 27,500,000			2		3																				
Novato Sanitary District		Treatment facilities expansion in eastern Marin	1- 22,000 2- 220,000 3- 2,200,000	I										1	2	3												
Marin Municipal Water District and Marin County Water District No. 1	1257	Reclamation facilities -- lower Ross Valley	1- 2- 3- 220,000	I		3																						
Marin County		Wastewater management in unsewered areas of San Geronimo Valley	1- 35,000 2- 140,000 3- 2,025,000	III					1	2		3																

MARIN COUNTY (Continued)				FISCAL YEAR (AND ASSIGNED STEPS)																										
Implementing Agency	Project No. (SMRCB)	Description of Project	Estimated Cost by Steps	Priority Group ^a	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001		
North Marin County Water District	1313	Olens and Point Reyes National Seashore Headquarters treatment and land disposal facilities	1-	I																										
			2- 80,000																											
			3- 1,000,000																											
North Marin County Water District	1286	Point Reyes Station treatment and disposal facilities	1-	I																										
			2- 80,000																											
			3- 1,000,000																											
Stinson Beach County Water District	1207	Sewage management for unsewered areas	1-	I																										
			2- 100,000																											
			3- 1,000,000																											
Bolinas Community PUD		Sewage management for unsewered areas	1-	III																										
			2-																											
			3-																											
California Dept. of Parks and Recreation		Muir Beach collection, treatment, and disposal facilities	1-	I																										
			2- 85,000																											
			3- 1,085,000																											
California Dept. of Parks and Recreation	1317	Angel Island State Park interceptor sewer and land disposal facilities	1-	I																										
			2- 100,000																											
			3- 750,000																											

NAPA COUNTY

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SURCS)	Description of Project	Estimated Cost by Steps	Priority Group	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000
City of Calistoga		Collection sewer	1- 10,000 2- 21,000 3- 228,000	III				1		2	3																
City of Calistoga	0789	Reclamation	1- 2- 20,500 3- 215,350	I		2	3																				
Napa Sanitary District and Carneros Water District	1437	Facilities plan for reclamation potential	1- 2- 200,000 3- 4,500,000	I			2	3																			
Napa Sanitation District		Collection sewer	1- 30,000 2- 185,000 3- 2,835,000	III				1		2	3																
City of St. Helena	1316	Upgrading treatment and complying with Basin Plan objectives	1- 2- 66,000 3- 1,400,000	I			2	3																			
City of St. Helena		Thomas Lane interceptor	1- 4,000 2- 6,000 3- 60,000	III				1		2	3																
Napa County	1314	Treatment and/or transport for unsewered Community-Ederly Island	1- 2- 31,000 3- 461,000	I			2	3																			
Napa County	1314	Collection system for unsewered community - Ederly Island	1- 2- 30,000 3- 470,000	III			2	3																			
Napa County	1525	Facilities plan for countywide septage study	1- 25,000 2- 3-	I		1																					
Napa County		Collection and treatment system for unsewered area of Angwin	1- 30,000 2- 120,000 3- 2,150,000	III					1	2	3																

SAN FRANCISCO			FISCAL YEAR (AND ASSIGNED STEPS)																									
Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
San Francisco City and County	1252	Ocean outfall	1- 2- 3- 100,000,000	I																								
San Francisco City and County	1253	West Side pump station	1- 2- 3- 40,000,000	I																								
San Francisco City and County	1253	West Side transport - Phase I	1- 2- 3- 70,000,000	I																								
San Francisco City and County	1253	West Side transport - Phase II	1- 2- 7,500,000 3- 37,500,000	I																								
San Francisco City and County	1253	West Side transport - Lake Merced	1- 2- 5,000,000 3- 50,000,000	I (unscheduled) (unscheduled)																								
San Francisco City and County	1289	Southwest dry weather primary and secondary plant - Phase I	1- 2- 10,000,000 3- 60,000,000	I																								
San Francisco City and County	1289	Southwest dry weather primary and secondary plant - Phase II	1- 2- 3- 125,000,000	I																								
San Francisco City and County	1399	Islands Creek pump station and storage facilities	1- 2- 5,000,000 3- 100,000,000	I																								
San Francisco City and County	1399	Sunnydale/South Basin facilities	1- 2- 5,000,000 3- 100,000,000																									
San Francisco City and County	1399	North-South highlevel crosstown transport-Stage I	1- 2- 5,000,000 3- 100,000,000	I																								
San Francisco City and County	1399	North-South Highlevel Crosstown transport - Stage II	1- 2- 5,000,000 3- 100,000,000	I																								
San Francisco City and County	1399	Channel Basin facilities	1- 2- 8,000,000 3- 80,000,000	I																								
San Francisco City and County	1315	Long Cabin Ranch School treatment plant additions	1- 6,000 2- 8,000 3- 63,000	I																								
San Francisco City and County		Wastewater solids management facilities	1- 2- 3,000,000 3- 30,000,000	I																								
Port of San Francisco		Collection sewers	1- 12,000 2- 24,000 3- 264,000	III																								

FISCAL YEAR (AND ASSIGNED STEPS)

SAN MATEO COUNTY		Project No. (SWRCB)	Description of Project	Estimated Cost by Steps a	Priority Group b	77-78	73-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
C South Bayside System Authority			Facilities plan for wastewater reclamation	1- 30,000	I		1																						
C South Bayside System Authority			Wastewater reclamation project for industrial use and landscape irrigation	1- 2- 150,000 3- 3,000,000	IV				2 3																				
South Bayside System Authority			Subregional plant expansion	1- 50,000 2- 350,000 3- 8,000,000	III		(unscheduled) (unscheduled)			1																			
C City of Redwood City			Facilities plan for reclamation	1- 30,000	IV		1																						
C City of Redwood City			Wastewater reclamation project for landscape irrigation	1- 2- 206,000 3- 3,364,000	IV				2 3																				
City of Redwood City			Collection sewers near Emerald Lake Hills	1- 8,000 2- 75,000 3- 658,000	III				1		2	3																	
Menlo Park Sanitary District			Sewage management for Portola Valley and Woodside	1- 50,000 2- 3-	I		1																						
C Menlo Park Sanitary District			Wastewater reclamation	1- 2- 130,000 3- 2,500,000	IV		1						2 3																
C City of San Mateo	1445		Facilities plan for reclamation potential	1- 10,000 2- 30,000 3- 600,000	IV				1 2 3																				
City of San Mateo			Collection system repairs	1- 60,000 2- 600,000 3- 5,340,000	III				1 2 3																				
Cities of San Mateo and Foster City			Plant expansion	1- 20,000 2- 190,000 3- 5,000,000	III		1 2		3																				
C City of Foster City			Wastewater reclamation project re-using treated wastewater within Foster City	1- 28,000 2- 3-	I		1																						
C North Bayside System Unit			Facilities plan for wastewater reclamation	1- 20,000	I		1																						
C North Bayside System Unit Agency			Wastewater reclamation project for industrial use	1- 2- 280,000 3- 6,000,000	IV					2 3																			

SAN MATEO COUNTY (Continued)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	FISCAL YEAR (AND ASSIGNED STEPS)																							
					77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
City of Millbrae	1440	Pump station and interceptor	1- 15,000 2- 11,000 3- 126,000	III		1 2																						
							3																					
^c City of Millbrae		Facilities plan for wastewater reclamation	1- 5,000	IV						(unscheduled)																		
^c City of Millbrae		Reclamation facilities	1- 2- 50,000 3- 500,000	IV						(unscheduled)																		
										(unscheduled)																		
^c City of Burlingame	1444	Facilities plan for reclamation potential	1- 2- 10,000 3- 100,000	I																								
						2 3																						
City of Burlingame		Construction of trunk sewers to control wet weather flow	1- 25,000 2- 35,000 3- 300,000	III																								
										1	2	3																
San Francisco International Airport		San Francisco Airport plant improvement to meet requirements	1- 20,000 2- 280,000 3- 6,000,000	I			1																					
								2		3																		
^c San Francisco International Airport		Facilities plan for wastewater reclamation	1- 20,000	IV						(unscheduled)																		
^c San Francisco International Airport		Wastewater reclamation project re-using treated wastewater for landscape irrigation within the Airport	1- 2- 280,000 3- 10,000,000	IV						(unscheduled)																		
										(unscheduled)																		
Town of Colma	1441	Sewage interceptor system	1- 2- 54,000 3- 932,000	III																								
										2	3																	
^c Bayshore Sanitary District		Facilities plan for wastewater reclamation	1- 35,000	I		1																						
^c Bayshore Sanitary District		Wastewater reclamation project	2- 70,000 3- 950,000	IV																								
							2 3																					
North San Mateo County S.D.	1439	Facilities plan for ultimate subregional sludge disposal	1- 25,000 2- 3-	I	1																							
^c North San Mateo County S.D.	917A	Reclaimed wastewater outfall- Stage I	1- 2- 70,000 3- 685,000	I																								
							2 3																					

SAN MATEO COUNTY (Continued)

Implementing Agency	Project No. (SWRCB)	Description of Proj.	Estimated Cost by Steps ^a	Priority Group ^b	FISCAL YEAR (AND ASSIGNED STEPS)																							
					77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
North San Mateo County S.D.		Reclaimed wastewater outfall Station 11	2- 300,000 3- 2,943,000	I		2 3																						
North San Mateo County S.D.		North San Mateo C.S.D. plant expansion	1- 20,000 2- 200,000 3- 2,000,000	I															1		2		3					
City of Pacifica		Infiltration/inflow study and necessary sewer repairs to eliminate by-passing and overflows of untreated sewage	1- 80,000 2- 200,000 3- 1,800,000	III				1		2	3																	
City of Pacifica		Wastewater reclamation project for landscape irrigation	1- 30,000 2- 3-	IV		1																						
City of Pacifica		Pacifica plant expansion	1- 20,000 2- 200,000 3- 2,000,000	I				1		2	3																	
Sewer Authority Mid-Coastside	1022	Subregional facilities for Half Moon Bay, Montero, and Granada	1- 2- 3- 5,600,000	I		3																						
Sewer Authority Mid-Coastside	1022	Ocean outfall	1- 2- 3- 600,000	I		3																						
San Mateo County	1436	Collection system for Emerald Lakes Hills	1- 2- 580,000 3- 5,300,000	I		2 3																						
San Mateo County		Wastewater management for unsewered areas-- Cuesta La Honda	1- 30,000 2- 120,000 3- 2,150,000	III				1		2	3																	
San Mateo County		Wastewater management for unsewered areas-- Redwood Terrace	1- 10,000 2- 36,000 3- 554,000	III				1		2	3																	
San Mateo County		Wastewater management for unsewered areas-- Woodside Highland	1- 15,000 2- 65,000 3- 1,120,000	III				1		2	3																	
San Mateo County		Wastewater management for unsewered areas-- Stonegate	1- 10,000 2- 36,000 3- 554,000	III				1		2	3																	
San Mateo County		Wastewater management for unsewered areas-- Los Trancos Woods	1- 30,000 2- 120,000 3- 2,150,000	III				1		2	3																	

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SAN MATEO COUNTY (Continued)		Estimated Cost by Steps ^a	Priority Group ^b	FISCAL YEAR (AND ASSIGNED STEPS)																											
Implementing Agency	Project No. (SWRCB)			Description of Project	77- 78	78- 79	79- 80	80- 81	81- 82	82- 83	83- 84	84- 85	85- 86	86- 87	87- 88	88- 89	89- 90	90- 91	91- 92	92- 93	93- 94	94- 95	95- 96	96- 97	97- 98	98- 99	99- 2000	2000	2001		
San Mateo County		Wastewater management for unsewered areas-- Paloma Park	1- 40,000 2- 165,000 3- 3,195,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- Arrowhead Meadows	1- 15,000 2- 65,000 3- 1,120,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- Alpine Hills	1- 20,000 2- 90,000 3- 1,590,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- Woodside Hills	1- 30,000 2- 280,000 3- 2,490,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- Vista Verde	1- 20,000 2- 90,000 3- 1,590,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- unincorporated areas in Skylonda	1- 20,000 2- 90,000 3- 1,590,000	III					1 2 3																						
San Mateo County		Wastewater management for unsewered areas-- Canada Road	1- 10,000 2- 36,000 3- 554,000	III					1 2 3																						
City of Burlingame		Burlingame plant expansion	1- 40,000 2- 400,000 3- 4,000,000	I												1			2										3		

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SANTA CLARA COUNTY

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
City of Palo Alto	1076	Solids handling facilities	1- 2- 113,000 3- 2,000,000	I		2 3																						
City of Palo Alto		Process control and data management system	1- 2- 3- 270,000	III		3																						
City of Palo Alto		Plant expansion	1- 40,000 2- 3-							(unscheduled) (unscheduled)																		
City of San Jose		Collection system repairs	1- 50,000 2- 222,000 3- 2,225,000	III				1	2	3																		
^c City of San Jose		Facilities for reclamation-- landscape golf course and agricultural irrigation	1- 2- 100,000 3- 1,000,000		2 3																							
City of Santa Clara	1438	Northside pump station and force main enlargement	1- 12,000 2- 120,000 3- 1,200,000	III				1		2	3																	
City of Santa Clara		Collection sewers	1- 16,000 2- 37,000 3- 427,000	III				1		2	3																	
^c City of Santa Clara		Reclamation project	1- 12,000 2- 121,000 3- 1,212,300	IV				1 2 3																				
Cupertino S.D. and City of Santa Clara		Interceptor sewer	1- 35,000 2- 130,000 3- 1,835,000	III					1	2	3																	
Milpitas S.D.		Collection sewers	1- 18,000 2- 42,000 3- 490,000	III					1		2																	
Cities of San Jose and Santa Clara	1381	Solids handling facilities and sludge disposal facilities	1- 2- 2,000,000 3- 30,000,000	I		2 3																						
^c Santa Clara Valley Water District and Cupertino S.D.	1433	Facilities plan for reclamation project	1- 70,000 2- 3-	I	1																							

SANTA CLARA COUNTY (Continued)

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001
^c Santa Clara Valley Water District		South Santa Clara Valley water reuse study -- joint subregional project	1- 500,000			1																						
^c Santa Clara Valley Water District	1403	Joint water reclamation project between Milpitas S.D. and Santa Clara Valley W.D.	1- 650,000 2- 6,500,000 3-	I		2		3																				
Santa Clara Valley Water District		Evaluation of expanded salt water intrusion barrier for South Bay	1- 20,000 2- 3-	I		1																						
Santa Clara Valley Water District		Design and construction of expanded salt water intrusion barrier for South Bay	1- 30,000 2- 425,000 3-					2		3																		
South Bay Dischargers Authority	1135	Subregional interceptor and outfall	1- 2- 3,600,000 3- 70,000,000	I		2		3																				
Santa Clara County S.D. No. 4		Lake Canyon and Montevina collection sewers	1- 8,000 2- 16,000 3- 166,000	III				1		2		3																
City of Morgan Hill		Interceptor from Morgan Hill to Gilroy	1- 35,000 2- 130,000 3- 1,835,000	III				1		2		3																
City of Gilroy	1019	Gilroy-Morgan Hill joint secondary plant	1- 2- 7,300,000 3-	I			3																					
City of Gilroy		Plant expansion	1- 20,000 2- 200,000 3- 2,000,000	I				1		2		3																
Santa Clara County		Wastewater management for unsewered areas -- San Martin	1- 12,000 2- 3-	(unscheduled) (unscheduled)					1																			
Cities of San Jose and Santa Clara		Primary treatment facilities addition	1- 7,000 2- 70,000 3- 702,000	III				1		2		3																
Cities of San Jose and Santa Clara		Expansion of advanced treatment facilities	1- 78,500 2- 784,600 3- 846,000	I				1		2		3																

[illegible]

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SONOMA COUNTY

FISCAL YEAR (AND ASSIGNED STEPS)

Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps	Priority Group ^b	77-	78-	79-	80-	81-	82-	83-	84-	85-	86-	87-	88-	89-	90-	91-	92-	93-	94-	95-	96-	97-	98-	99-	2000-	
					78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	2001	
Sonoma Valley County S.D.	0834	Sonoma Valley C.S.D. secondary plant improvements and expansion	1- 2- 3- 13,400,000	I																									
Sonoma Valley County S.D.		Effluent outfall and storage	1- 2- 3- 10,900,000	I																									
Sonoma Valley County S.D.		Jack London Country Club Estates collection system	1- 12,000 2- 24,000 3- 264,000	III								1 2 3																	
Sonoma Valley County S.D.		Kenwood collection system	1- 35,000 2- 130,000 3- 1,835,000	III								1 2 3																	
Sonoma Valley County S.D.		Sonoma Valley C.S.D. plant expansion	1- 50,000 2- 500,000 3- 5,000,000	I														1		2									
Sonoma Valley County S.D.		Construction of storage, pipeline and irrigation distribution system	1- 250,000 2- 2,600,000 3- 23,800,000	IV									1		2		3												
City of Petaluma		Expansion of irrigation system	1- 6,000 2- 57,000 3- 500,000	III											1 2		3												
City of Petaluma		Petaluma plant expansion	1- 50,000 2- 500,000 3- 5,000,000	I												1		2		3									
Sonoma County		Collection system westerly of the Petaluma city limits	1- 30,000 2- 100,000 3- 1,370,000	III								1 2 3																	
Sonoma County		Collection system for Petaluma Blvd., Bailey Ave., Gossage Ave., Jessie Lane and Skillman Lane	1- 15,000 2- 150,000 3- 1,500,000	III								1 2 3																	
<u>Regional</u>																													
Regional reclamation and reuse of waste-water management group	1432	Regional reclamation facility	1- 2- 35,000,000 3- 800,000,000	III																									

(unscheduled)
(unscheduled)

			ERRATA		FISCAL YEAR (AND ASSIGNED STEPS)																											
			Projects Added																													
Implementing Agency	Project No. (SWRCB)	Description of Project	Estimated Cost by Steps ^a	Priority Group ^b	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001				
Richardson Bay Sanitary District	1599	Collection sewers for area with prohibition and time schedule-- Greenwood Beach	2-	30,000																												
			3-	140,000																												
San Francisco City and County	1247	North Point conversion for wet weather and transport to Southeast	2-	200,000																												
			3-	2,000,000																												

Section K

DIRECT INDUSTRIAL WASTE DISCHARGES

Table 9 lists significant direct industrial discharges in the region.

Treatment levels for direct industrial discharges are specified in the Federal Pollution Control Act Amendments of 1972. Industrial dischargers were required to install "best practicable treatment" by July, 1977. "Best practicable treatment" is roughly equivalent to secondary treatment for municipal discharges. All industrial dischargers in the region have met or are close to meeting this requirement.

The Act also requires that industrial dischargers install "best available treatment" by July, 1983. "Best available treatment" has been defined on an industry-by-industry basis and usually includes advanced wastewater treatment methods. Some of the industrial dischargers in the region already meet this requirement. Most will have to install further treatment facilities, however.

Table 9. - Direct Industrial Dischargers

Location	Discharger Name	Process ^a Flow (MGD)	Once-Through ^b Flow (MGD)
<u>Marin-Sonoma</u>	No significant discharges		
<u>Napa-Solano</u>			
	Kaiser Steel Co. Shipyard	-	0.4
Vallejo-Mare Island	Mare Island Naval Shipyard	-	1.5
Benicia	Exxon Co.	2.2	-
<u>Contra Costa</u>			
<u>Antioch</u>	Crown Zellerbach	3.8	8.4
	E.I. Dupont de Nemours & Co.	1.5	-
	Fibreboard Corp.	13.0	-
	Hickmott Foods, Inc.	0.6	1.0
	PG&E-Antioch	0.7	600
Pittsburg	Allied Chemical Corp.	1.6	1.1
	Dow Chemical, USA	0.5	4.0
	PG&E-Pittsburg	0.3	896
	U.S. Steel Corp.	8.0	11.3
Central Contra Costa	Lion Oil Co.	4.5	4.5
	PG&E-Avon	0.3	-
	PG&E-Martinez	0.2	-
	Shell Oil Co.	3.8	-
Crockett-Port Costa	C&H Sugar Co.	2.7	17.6
Rodeo	PG&E-Oleum	0.2	80
	Union Oil Co.	2.1	40
Pinole	Pacific Refining	0.1	-
	Valley Nitrogen	1.8	-
Richmond	Chevron, USA	19.5	97
	Willamette Iron & Steel Co. Shipyard	-	2.4
<u>East Bay</u>			
<u>EBMUD</u>	Colgate-Palmolive Co.	-	0.6
	DeLaval Turbine Co.	0.9	-
	Gerber Products Co.	0.5	-
	Merritt Ship Repair Co.	-	0.3
	Todd Shipyard Co.	-	2.1
Newark	FMC Corp.	0.8	-
<u>Livermore-Valley</u>	No significant discharges ^c		
<u>South Bay</u>	No significant discharges		
<u>San Mateo</u>			
Redwood City	Marine World-Africa USA	-	13
So. SF Airport, San Bruno	Merck & Co.	-	3.6
	San Francisco Airport	1.5	-
<u>San Francisco</u>			
<u>Southeast</u>	Bethlehem Steel Shipyard	-	2.5
	PG&E-Hunters Point	0.2	280
	PG&E-Potrero	-	350
	Triple A Shipyard	-	3.7
<u>Regional Total, Industry</u>		78.3	

^aProcess flow is the flow of wastewater that results from industrial processing activities. Untreated it is often heavily contaminated.

^bOnce-through flow is water withdrawn from the receiving water, used once for cooling purposes and returned to the receiving water. Return water contains waste heat but is usually otherwise uncontaminated.

^cSome concern has been expressed regarding discharges of radioactive waste from Vallecitos Nuclear Center. Analysis indicates that this does not appear to be a significant source of pollutants. The discharge complies with requirements set by the Regional Water Quality Control Board. Some independent check on the self-monitoring program may be desirable however.

Section L

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Chapter IV
WATER SUPPLY
MANAGEMENT

Section-A

SUMMARY DESCRIPTION OF PLAN RECOMMENDATIONS

The Water Supply Management Plan is a plan for supplying water to the Bay Area for the next twenty years--at a minimum monetary and environmental cost. The 1976-77 drought has affected the nature and content of the plan. The quantities of water that existing and planned facilities can reliably deliver are less than previously thought. Exactly how much less will not be known until the effects of the drought are fully analyzed. Because of this uncertainty the plan does not recommend that particular water supply projects should or should not be built. The plan will be updated as more information accumulates.

Extensive technical analyses were undertaken during the development of this plan. A list of background documents produced earlier in the planning program is included in Section I. Some of these materials are included in Appendix E.

The existing arrangements for supplying water to the Bay Area have been notably successful. Until this year few activities in the region have been limited by lack of water. Water supplies have rarely been rationed and then only for brief periods. Why, then, do we need to develop a water supply plan? It is because circumstances are changing; we will need more water in the future but there is a growing reluctance on the part of many people to accept the costs and environmental consequences of the large landscape-altering projects necessary to deliver it.

Although the Bay region is water-short, in that it uses more water than can be captured in the regional watershed, abundant water can be had from more remote sources. By the 1920s local sources of water were inadequate to supply the growing urban area. To supplement supplies the Hetch-Hetchy and Mokelumne systems were built to bring water to the region from the Sierra Nevada. At the time the water was diverted it was regarded as "surplus" water. If it hadn't been diverted it would simply have flowed out of the delta to be wasted in the ocean. However, the concept of "surplus" water was never a sound one. Diversion of water for one purpose often makes it unavailable for another. No water is truly surplus; it is just that society considers some uses to be more important or valuable than others.

Recent years have seen a shift in cultural values. Water uses once thought to be of no value are prized by many people. The desire to store water and convey it to the cities is in conflict with the desire to maintain flows in rivers, streams and the Sacramento-San Joaquin Delta. These flows are necessary for recreation and wildlife preservation as well as municipal and agricultural uses. When the water diverted was "surplus" water there was little reason to avoid waste. Now that it is recognized that five gallons of water wasted flushing a cigarette butt down the toilet multiplied millions of times means that more desirable uses of water will be foregone, a re-examination is necessary.

Thus, we are faced with a dilemma. How can we obtain water to satisfy some of our needs without impairing or eliminating other uses of water? The answer is to use the water available to us as efficiently as possible and without waste. This plan represents a step toward that goal.

In 1975, before the 1976-77 drought, the region used 1580 million gallons per day (mgd) of water. About 40 percent of this water was used for agriculture, the remainder being used in homes and businesses. By the year 2000 the demand for water would be expected to rise 23 percent to 1940 mgd if we continued to use water in the same way as we did before the drought. The drought, however, has caused uncertainties in water planning. Before the drought it was assumed, based on past experience, that as population increased and the standard of living rose per capita water use would increase. Now we are not so sure. Public response to emergency water savings programs during the drought was dramatic and commendable. In many water district service areas water savings exceeded goals. And for most of the region, using less water did not appear to have caused severe personal hardship. Does this mean that water saving could become a permanent feature in the Bay Area? No one is certain.

There are three ways we can match our future demand for water with our future supply: we can use less--water saving, we can use water twice--wastewater reclamation and reuse, and we can develop new sources. Each of these alternatives has certain advantages and disadvantages.

The least expensive way to match supply and demand is to save water. But water saving alone cannot reduce demand by more than 12 to 17 percent without probably unacceptable changes in lifestyle. However, water saving built up considerable momentum as a result of the drought. Many of the major water suppliers developed innovative and demonstrably successful water savings programs. If the momentum can be maintained now the drought is over, there is no doubt that water saving could play a role in matching supply and demand. It is apparent, however, that in some areas current water use is running 10 - 20 percent below that experienced before the drought. It is not known whether a permanent change in water use patterns has occurred.

Wastewater reclamation and reuse can be expected to supply about 6 percent of the region's water needs by the year 2000. Further use of reclaimed water is prevented by high cost, health-related limitations on use and lack of markets close to wastewater treatment facilities.

Development of new sources of water tends to be costly and environmentally damaging. All the closer and more easily obtainable sources of water have been developed. Those that remain are far from the urban centers. Long and costly pipelines are needed to bring water into the region from these sources.

Two other factors affect the efficiency of water use in the region. Water is supplied to consumers by 83 separate agencies from eight separate sources. Each major agency operates fairly independently, securing its own sources. It is conceivable that this leads to the development of more separate sources than would be the case if responsibility for water were less diffuse. This possible inefficiency is compounded by the lack of connections between water systems. If there were more ties between

systems the water available to the region could be distributed more evenly to consumers. Interties between systems would make our water supply systems more flexible; somewhat in the manner of our electrical power grid where power can be readily conveyed from any source to any consumer. In response to the drought emergency several interties were created; the most notable being the pipe across the Richmond-San Rafael Bridge which conveys water originally destined for Los Angeles to Marin County via the East Bay Municipal Utility District system.

It should be noted, however, that there are considerable institutional barriers to inter-agency water transfers under normal or non-emergency conditions. Existing water rights would be affected and certain water delivery contracts would have to be renegotiated. The net result could conceivably be a loss of water currently allocated to the Bay Area to some other part of the State and an increase in the cost of water to Bay Area consumers.

A second possible inefficiency stems from the fact that municipal water supply systems are planned to supply water normally during droughts. As a consequence many of our water supply facilities are underused during wet or even normal years. As the drought demonstrated we can cut water use substantially without great hardship. Perhaps occasional water rationing is tolerable and could be an ongoing feature of water supply planning if it would cut the cost and reduce the adverse environmental effects of developing new sources.

This plan does not attempt to resolve the water supply dilemma for all time. What it does is to try to provide a sense of direction which will, in the long-term, lead to more efficient use of water. The general philosophy underlying the plan is as follows. We should take steps immediately to save or reuse our existing supplies wherever this can be done at a cost (economic, environmental and social) lower or equal to the cost of new supplies. In addition we should establish a mechanism for determining what steps are necessary in the future to ensure efficient water use.

Central to the plan recommendations is the formation of a water management coordinating committee (WMCC). The committee would include representatives of all the major water and wastewater agencies. The committee would provide a forum for discussion and perhaps resolution of issues relating to long-term water supply planning, interagency transfers of water, water conservation, wastewater reclamation and drought contingency planning. The WMCC would undertake studies of common interest to members. In this way the benefits of cooperative water supply planning could be obtained.

The cheapest water is water saved. The plan recommends the establishment or continuation of water savings programs emphasizing the building-in of water saving devices in new construction. City and county building codes should be modified accordingly. Retrofit of water conservation devices in existing construction should be encouraged by tax incentives as should the trend toward more efficient agricultural irrigation.

Two million dollars have been allocated by the State Water Resources Control Board for a regional study of wastewater reclamation and reuse. It is recommended that this study proceed as rapidly as possible. Funding priority should be given to those reclamation and reuse projects which reduce the regional demand for high quality water by substituting reclaimed wastewater where appropriate.

Section-B

PRESENT WATER USE AND SUPPLY ARRANGEMENTS

This section describes how water is used in the Bay region and from whence it comes.

WATER USE

In 1975, the last year of record before the drought, 1610 million gallons per day (mgd) of water was used in the region. About 40 percent of this water was used for crop irrigation mostly in the northern counties. A further 40 percent was used in private homes and by public institutions, such as hospitals. The remaining 20 percent was used by industry and commerce. In the region municipal water use averaged 199 gallons per capita per day (gpcd) varying from a low rate of 145 gpcd in Sonoma County to a high rate of 271 gpcd in Contra Costa County. Present water use by county is shown in Table 1.

WATER SUPPLY FACILITIES

In the early stages of development in the Bay Area, communities relied upon local surface water and groundwater for their supplies. When these sources became inadequate to meet the needs of a rapidly growing population other more remote sources were developed. At the present time about one-third of the regions' water comes from local surface and groundwater. Another one-third comes from surface water sources, the Sacramento-San Joaquin Delta, Lake Berryessa and Russian River, near the boundaries of the region. The last one-third comes from the western slope of the Sierra Nevada.

Water is supplied to the region from eight separate sources or systems. Figure 1 shows how supplies are brought into the region. Table 2 shows the quantities obtained from each source in 1975.

The Hetch-Hetchy system, built and operated by the City and County of San Francisco, consists of three reservoirs on the Tuolumne River watershed--Hetch-Hetchy, Lake Eleanor, and Lake Lloyd--and the Hetch-Hetchy Aqueduct, which extends about 135 miles from the Tuolumne River to Crystal Springs Reservoir located in San Mateo County.

The Mokelumne system, built and operated by the East Bay Municipal Utility District, consists of Pardee Reservoir and Camanche Reservoir, developed on the Mokelumne River, and the Mokelumne Aqueduct, which transports water to terminal reservoirs in western Contra Costa County and Alameda County.

The South Bay Aqueduct, a system of the State Water Project, diverts water from the California Aqueduct near Tracy and delivers water as far west as San Jose.

Table 1.

Water use by county in 1975
(million gallons/day)

COUNTY	Inside Resid.	Outside Resid.	Comm'l Ind'l.	Public Authority	Unacc'td For	Non- Agric.	Agric.	County Total
Alameda	81	30	62	7	16	196	18	214
Contra Costa	44	25	67	6	10	152	109	261
Marin	15	12	4	2	3	36	2	38
Napa	5	4	5	1	2	17	19	36
San Francisco	31	4	50	9	5	99	0	99
San Mateo	44	22	25	4	3	98	7	105
Santa Clara	99	43	77	24	17	260	99	359
Solano	14	7	14	6	2	43	362	405
Sonoma	<u>14</u>	<u>8</u>	<u>8</u>	<u>2</u>	<u>2</u>	<u>34</u>	<u>59</u>	<u>93</u>
REGION	347	155	312	61	60	935	675	1,610

Table 2.
Sources of water in 1975*

SOURCE		AMOUNT (Million gallons/day)
Sierra Mountains		460
Sacramento-San Joaquin Delta		325
Russian River		52
Lake Berryessa		179
Other Local Reservoirs		108
Santa Clara County		35
Marin County		28
Napa County		17
Alameda & Contra Costa Counties		20
Other Counties		8
Groundwater		486
Santa Clara County		178
Alameda County		51
Solano County		181
Sonoma County		48
Other Counties		28
TOTAL		1,610

*This table does not necessarily show safe yields from each source. It shows amounts actually used in 1975, most of which differ from the safe yield.

The Russian River system, built and operated by the Sonoma County Water Agency, consists of diversion structures located near Guerneville and aqueducts leading to the City of Santa Rosa, the Sonoma Valley, City of Petaluma, and northern Marin County.

Lake Berryessa, located in northeastern Napa County, is part of the Solano Project, which was developed and is operated by the United States Bureau of Reclamation.

The Contra Costa Canal, operated by the Contra Costa County Water District, delivers water to that county.

Local groundwater is an important water source in Alameda, Santa Clara, Solano and Sonoma Counties.

In-county surface water sources supply significant quantities of water in Marin, Napa, Santa Clara and Sonoma Counties.

Institutional Arrangements for Water Supply

Water is supplied to consumers by 83 separate water distribution or re-tailing agencies. In some cases, San Francisco Water Department and East Bay Municipal Utility District, for example, the same agency owns and operates a major water delivery system and retails water. More commonly a distribution agency buys water from a wholesaler such as the Santa Clara Valley Water District.

The largest water retailer in the area is East Bay Municipal Utility District which served 210 mgd to a little over a million consumers in 1975. The City of San Francisco and San Jose Waterworks each serve between 600,000 and 700,000 customers.

About half the water distribution agencies are cities, 19 are special districts and 22 are private companies. The operations of the private companies are regulated by the State Public Utilities Commission.

Section-C

WATER SUPPLY PROBLEMS AND POSSIBLE SOLUTIONS

To refer to the water supply situation as a problem is in some ways a misnomer. Until 1976-77 few activities in the region had been limited by lack of water. Water supplies have rarely been rationed and then only for brief periods. Perhaps a better term would be the water supply dilemma.

The dilemma is how to reconcile our need for water with concerns about the environmental effects of developing new water supplies. The situation is complicated by the fact that we are faced with a drought that is prompting a reexamination of the fundamentals of water supply planning. Three factors affect the dilemma: the growing demand for water, the traditional approach to water supply planning and the way the water supply industry is organized. Each of these is discussed below.

WATER DEMAND

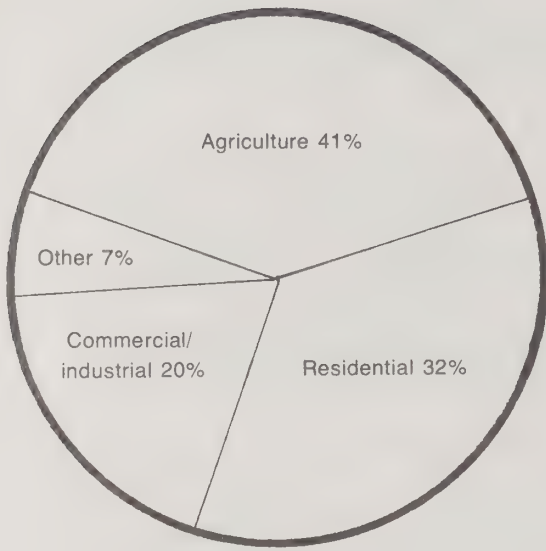
Estimates of future water demand were made based on ABAG's Series 3 population, and land use and employment projections. Two population projections were made using different assumptions about fertility and migration. Because of uncertainties about future fertility and migration rates two population projections were made using different assumptions. The two population projections envisage regional populations of 6.1 and 5.4 million in the year 2000 as compared to 4.9 million in 1975.

The demand for water in the region is expected to rise from its 1975 value of 1610 mgd to 1800-2013 mgd by year 2000 depending on the population increase. Unless otherwise noted the analyses described in this plan are consistent with higher population projection. Figure 2 shows what the Bay Area uses its water for, now and in the future. At present, two-fifths of the water supplied to the Bay Area is used for agriculture, mostly in the northern counties. Agriculture's share is expected to drop to less than one-third of the total in 2000 as farm land is used for new homes and businesses. On the other hand residential demand will rise from about one-third of the total at present to a little over two-fifths in 2000. Commercial and industrial water use will remain fairly constant for the next twenty-five years.

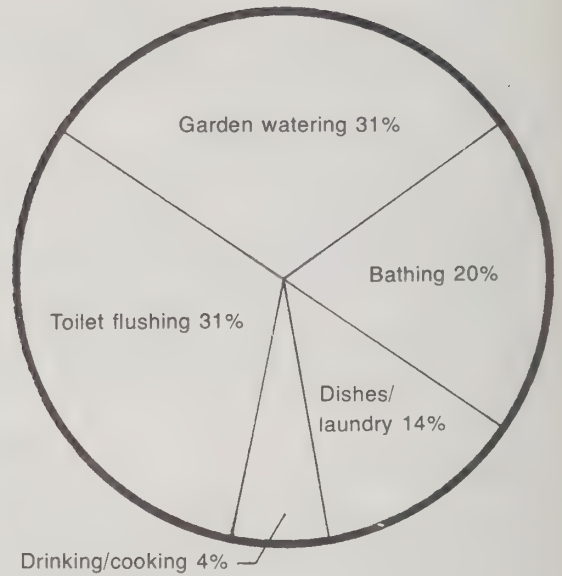
There are a number of ways to satisfy the demand for water. We can reduce demand by saving water; we can reclaim and reuse wastewater and we can develop previously untapped water sources. Determining what mix of these options will supply the region with water at a minimum monetary and environmental cost is at the heart of the water supply dilemma. Each of the options is explored in detail in the following chapter.

Figure 2.

Bay Area water use

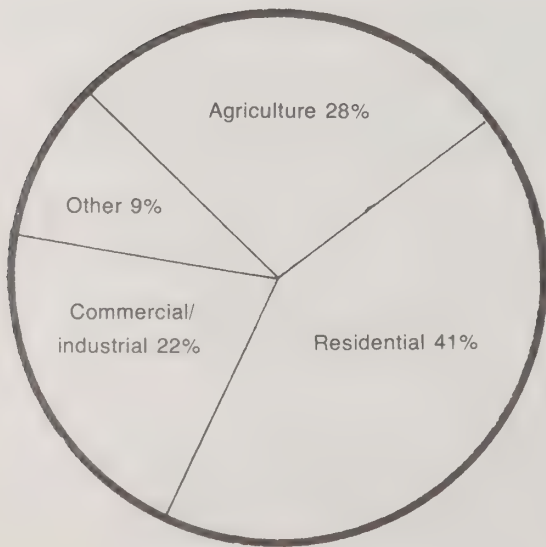


1580 mgd
Total

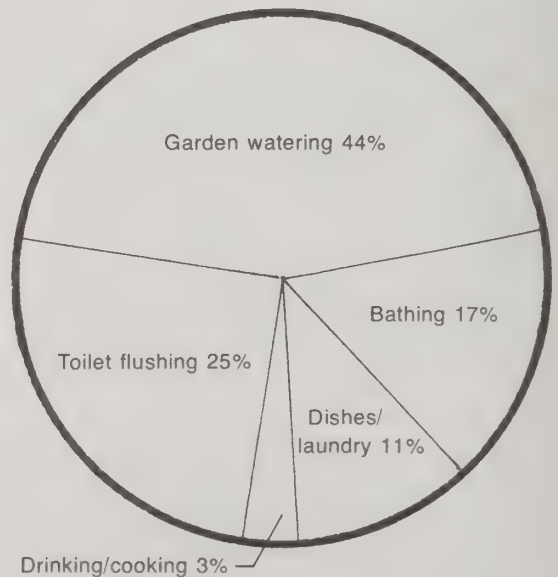


Residential

1975



1954 mgd
Total



Residential

2000

WATER SUPPLY PLANNING

The planning of most engineering works that are affected by unpredictable natural phenomena is based on a calculated risk. This is perhaps best illustrated by considering the design of a hypothetical flood control project.

A small town is situated on the bank of a large river. After a severe flood causing both loss of life and extensive property damage a decision is made to build a levee to protect the town in the future. The 50 years of streamflow records available are analyzed to determine what flood height might be expected. Scientific techniques are used to extend the period of record. The height of the flood that will occur once in fifty years is calculated. Similarly, flood heights that will occur every one hundred and every one thousand years are calculated. A ten-foot levee will protect the town from all floods smaller than the flood that occurs once in fifty years. Similarly twelve-foot and fifteen-foot levees will protect the town from all floods smaller than the floods that occur once in 100 and once in 1000 years respectively.

The higher the levee the more expensive it will be to build. A difficult decision must be made. A low levee will be relatively inexpensive but town residents will have to live with the fact that once in 50 years the town may be flooded. The high levee almost guarantees flood protection but will exhaust the city's funds. A calculated risk is taken. The city will build a twelve-foot levee and live with the consequences of a once in one hundred year flood.

The analysis described above is typical for many different engineering projects; high-rise buildings are designed to withstand an earthquake or hurricane that occurs once in 100 years, offshore oil drilling platforms are built to survive the impact of a wave that might occur once in 50 years. It is impossible to guard against all possible eventualities. Risks must be taken. The degree of risk thought to be acceptable is based on the seriousness of the consequences of failure of the structure in question. Where the consequences are minor a high degree of risk is acceptable. Where the consequences are catastrophic only a slight risk is acceptable. Levees in parts of Holland, for example, are designed to withstand the 1000 year storm because failure would flood one-third of that nation.

This type of risk analysis has not generally been applied to the planning of water supply projects. Traditional water supply planning is based on the principle that unrestricted water should be available to all consumers during the driest period of record. In the Bay Area this is the dry period experienced between 1928 and 1935. The present drought is more severe than all earlier ones for which records are available. Consequently, if traditional water supply planning methods are retained and when the full extent of the current drought is known, future water supply projects will be sized to provide unrestricted water use during a drought as severe as the present one.

As noted previously the cost of new water supply projects in both monetary and environmental terms is high. On the other hand the cost and inconvenience of occasional restrictions on water supply may be slight. It appears worthwhile to examine the traditional approach to water supply planning in the light of these trade-offs. Perhaps it is better to live with a greater risk of rationed water supplies if it allows us to build less water supply projects.

INSTITUTIONAL ARRANGEMENTS FOR WATER SUPPLY

As noted previously water is supplied to Bay Area residents by 83 separate water distribution agencies from eight different sources. These institutional arrangements, developed in the first half of this century, were well suited to the needs of the time; growth was rapid, communities were separated by broad areas of undeveloped land, water was abundant and public perceptions of the environmental damage caused by massive engineering works were low.

Circumstances have changed. Growth is slowing down. Although most cities maintain separate governments, physically and economically they merge into one another and into a metropolitan whole. Water can only be regarded as abundant if we are prepared to support the cost and accept the environmental consequences of large-scale water storage and conveyance facilities. It is becoming clear that water supply planning must be undertaken from a regional perspective if we are to use the water available to the area in a way that delivers water to the consumer at a minimum monetary and environmental cost.

Division of responsibility for water supply among many agencies can lead to inefficiency. Each major agency operates fairly independently, securing its own sources. It is conceivable that this leads to the development of more separate sources than would be the case if water were distributed more efficiently within the region.

The efficiency of the Bay Area's water supply arrangements might be improved in two ways. A metropolitan water agency could be created that would be responsible for all aspects of water supply from planning to service delivery. The metropolitan agency would develop the best of the new water sources available to the region and distribute water to all parts of the region. Although an agency of this type would probably be an efficient arrangement its creation would obviously involve drastic institutional changes which would be extremely controversial and difficult to accomplish.

A second approach appears more promising. Most of the advantages of regional water supply planning can be obtained if cooperation between existing agencies can be improved. Development of a mechanism for cooperative interagency water supply planning could lead to more efficient water use without the necessity for major institutional change.

WATER QUALITY PROBLEMS

Most Bay Area residents are supplied with water of unusually high quality. With the expectation of some temporary problems caused by the drought, serious water quality problems exist at the present. There is the possibility, however, that several problems might occur in the future if preventative measures are not taken.

Every year numerous new synthetic organic compounds are developed for various uses throughout human society. Inevitably some of these compounds find their way into the water supply albeit in minute concentrations. Evidence is accumulating that these substances may be harmful to health. It was in response to this and other concerns that Congress enacted the Safe Drinking Water Act of 1974. The full impact of the legislation is yet to be felt and consequently any analysis of its effectiveness in dealing with the problem is deferred until the "continuing planning" phase of the EMP.

A second cause for concern is contamination of groundwater. Groundwaters are a source of water supply to over 40 cities or water districts in the Bay Area. As the Bay Area population grows, and access to new fresh surface water supplies becomes more restricted, increasing demands will be placed upon local groundwaters.

Groundwaters can become contaminated due to overpumping. Removal of groundwater at a rate faster than it can be naturally replenished can lower the water table and let salty coastal water "pour" in. Reductions in freshwater outflow from the Sacramento-San Joaquin delta has contributed to this problem in the North Bay. The settling or sinking of land above the depleted groundwater basin is another problem that has been observed in the Bay Area. Another source of contamination is surface water percolation into the groundwaters. Obvious problems lie with faulty septic tank drainfields or well casings that may permit direct bacterial contamination of groundwater. A less obvious but still significant problem can occur where large numbers of properly operating septic tank systems exist. The dissolved mineral content of waters from these sources, particularly the nitrate ion, can cause health problems for persons drinking the contaminated groundwaters.

A number of the large water supply agencies are actively pursuing programs to protect or restore their groundwater basins. Also, the California Department of Public Health has labored to develop safe standards for groundwater recharge. Yet there are many locations within the Bay Area where no concerted effort is being undertaken to protect groundwaters from salt intrusion or poor quality recharge, particularly excess septic tank drainage.

In order to protect this vital Bay Area resource, groundwater basin management plans could be developed. A current, serious obstacle to such an action is the lack of a complete regionwide assessment of all groundwaters, their extent, natural recharge rates, current and projected pumping rates, and recharge programs.

Section-D

MATCHING SUPPLY WITH DEMAND

There are three ways to match water supplies with demand; we can use less water--water conservation*, we can use water twice--wastewater reclamation and reuse, or we can develop new sources. The effectiveness of each of these possible solutions to the water supply problem is described below.

WATER CONSERVATION

Conservation reduces the total demand for water. Because water is usually cheap and abundant it is often used wastefully; toilets are flushed to dispose of facial tissues or cigarette butts, lawns and crops are irrigated for unnecessarily long periods and until recently industry and commerce had little incentive to recycle water. Since the passage of the Federal Water Pollution Control Act Amendments of 1972 industry has incurred increased costs for wastewater treatment which has provided an incentive to reduce water use. Total water use can be reduced by eliminating the waste without causing the consumer significant inconvenience.

Residential Water Conservation

Figure 2 shows the percentages of water used for different purposes in a typical household now and in the year 2000. Bay Area water managers concur that, at least in a suburban environment, between 5 and 15 percent of residential water demand is simply wasteful use associated with flushing toilets unnecessarily, running water incessantly while washing, brushing teeth, shaving or washing cars and over-irrigating yards. There are many approaches to water conservation. Some are discussed briefly below.

Consumer education--There is no doubt that, in a crisis, a well presented public information program will yield dramatic results. Faced with the most severe water shortage in the Bay Area, the Marin Municipal Water District began an information and rationing program in January, 1977. By July the program had achieved an extraordinary savings of 63 percent as compared to a normal year. East Bay Municipal Utility District's programs have resulted in a 38 percent cutback in water use, during the drought. The effectiveness of public information and consumer education programs in a non-crisis situation are much less predictable. Because many water-wasting practices are due to established behavior patterns, the greatest long-term results can be achieved by educating the young.

* During the drought, in most of the region "conservation" has come to mean reducing the amount of water used. In the water supply profession, "conservation" has historically meant storing (conserving) water in reservoirs for later use. In this report, "conservation" will have the former meaning, that of saving water by not using it.

Retrofit programs--A large number of devices that can be applied to existing plumbing fixtures are available for reducing water use in the home. Typical devices are toilet tank displacement bottles that reduce the flush volume and shower head inserts that reduce maximum shower flow rates. Two model retrofit plans were considered in the development of this water supply plan. Both plans involve displacement bottles and shower head inserts but differ in the degree of effort employed to persuade the homeowner to install them. Under the "moderate" savings plan kits containing the water saving devices would be made available at distribution centers for pick up by consumers. Under the "maximum" savings plan kits would be delivered door-to-door. The "moderate" and "maximum" plans are estimated to result in savings of 1.7 and 4.1 gallons per person per day respectively.

Programs for new construction--Conservation devices built into new construction are more effective than the common retrofit devices. Devices include low-flush volume toilets, shower and faucet flow controllers that limit maximum flow rates, hot water pipe insulation to reduce "waiting time" for hot water, pressure regulators at individual homes, drought-tolerant landscaping, timer-controlled automatic sprinkler systems and trickle-drip irrigation systems. Two model savings plans were considered. A "moderate" savings plan employing most of the devices referred to above inside the home would result in savings of 16.6 gallons per person per day. The "maximum" savings plan, employing trickle-drip irrigation and automatic sprinklers outside the home, in addition to the same interior devices as in the "moderate" plan would result in savings of 31.6 gallons per person per day. Another water saving measure, applicable to new construction, which was not included in the model plans, is the use of native plants for landscaping. This could be encouraged by public education programs.

Conservation by Industry, Commerce and Public Authority

These types of consumers use water in a wide variety of ways. Because of this variation, and the scale of certain users the water utility should work with large users on a case-by-case basis to save water. Considerable amounts of water are used in commercial establishments and public agencies for sanitation purposes and landscape irrigation. The same water saving techniques applicable for residential customers are equally applicable to these institutions. More unusual conservation practices include use of soil-moisture detectors to more efficiently control landscape irrigation, use of recycled water in commercial refrigeration systems and elimination of "running water" situations such as dental office basins.

Industry uses water for cooling purposes, process water and for sanitation and irrigation. Cooling water use can be reduced by conversion from "once-through" to recycling systems.

Overall it appears that a 5 to 10 percent cut in water use by industry, commerce and public authority is reasonable.

Agricultural Water Conservation

Water conservation at the farm level can be achieved by leveling of land, shortening of irrigation runs, conversion to more efficient irrigation methods and by using low application rate techniques. Additional water can be saved at the irrigation district level by replacing open distribution canals with pipelines. Estimates of the water that might be saved in this way on county-by-county basis were made. It was assumed that 50 to 60 percent of the irrigated area which will remain in agriculture until the year 2000 will install more efficient irrigation systems. In addition it was assumed that in the year 2000 a further five percent saving will occur as a result of improved matching of water applications with crop needs. Estimates of water use in the year 2000 with and without conservation together with the 1975 use rate are shown in Table 3. Even without conservation agricultural water use will decline as land is converted from agriculture to other uses.

Table 3.

AGRICULTURAL IRRIGATION WATER USE BY COUNTY^a (acre-ft/yr)^b

County	1975	2000 Without Conservation	2000 With Conservation
Alameda	20,000	8,900	7,000
Contra Costa	121,900	95,600	85,400
Marin	2,400	900	600
Napa	21,500	19,800	18,800
San Francisco	0	0	0
San Mateo	8,200	9,700	9,200
Santa Clara	110,900	68,300	55,300
Solano	405,000	369,200 - 435,700 ^c	290,700 - 343,000
Sonoma	65,800	45,300	39,400
Region	756,300	617,700 - 684,200	506,400 - 558,700

^a Projections of water use are based on a year 2000 regional population of 6.1 million and do not assume compact development.

^b An acre-foot of water is the amount needed to cover one acre at a depth of one foot. 1118 acre-feet per year is equal to one million gallons per day (mgd). To convert the figures in this table to mgd, divide by 1118, or roughly by 1000. Keep in mind, though, that crop irrigation occurs primarily in the growing season. On a day in July, the use would be higher than implied by this table; in January it would be lower.

^c The lower end of range is ABAG estimate, high end Bureau of Reclamation estimate. The difference results from different assumptions with respect to the conversion of agricultural land to urban uses.

Water Pricing

Consumers are charged for water in a number of different ways. The most commonly applied charging method is the declining commodity rate. This type of rate stems from the cost-of-service philosophy; because the cost of service per gallon of water delivered declines with the volume of water delivered, large consumers are charged a lower rate per gallon than are small consumers. This approach ignores the fact that resources are limited and tends to encourage water use.

It is often argued that water pricing to increase conservation is not feasible because the demand for water is inelastic. Like gasoline, the price can double, but people just go on using it at the same rate. Recent studies suggest, however, that residential irrigation demand is in fact sensitive to price and does follow the laws of supply and demand.

An approach being studied by several California utilities and already implemented by a few eastern utilities is application of a seasonal or peak demand rate. A base rate applies for all water use in a given billing period. Use in excess of 130 percent of each customer's wintertime use is priced at several times the base rate. A study conducted in Marin indicated that a rate structure of this sort would result in a 11 to 12 percent reduction in water use.

Another instance of a common pricing arrangement that encourages wasteful use of water is the inclusion of minimum purchase requirements in wholesale water contracts. The retailer agrees in advance to take a certain minimum amount of water from the wholesaler regardless of need. In this way the wholesaler, being assured of a certain minimum revenue, can efficiently plan his operations in advance. Alternative pricing arrangements can satisfy the wholesalers' need for an assured income and encourage water conservation.

The Effectiveness of Water Conservation in Reducing Demand

In order to determine the effectiveness of the various conservation measures described previously in reducing overall water demand it was necessary to assemble the measures in a number of alternative programs. Eight programs were considered; the two most promising programs are discussed here and shown on Table 4.

Conservation Alternative A consists of the "moderate" residential savings plan together with a five percent cut in residential use as a result of public education, a five percent cut in commercial, industrial and public authority use and implementation of the level of agricultural conservation described earlier. Conservation Alternative B is similar except that the "moderate" residential savings plan is replaced with the "maximum" plan. Table 4 shows water use by subregion in the year 2000 with and without conservation. By the year 2000 conservation Alternative A and B would save approximately 240 and 280 mgd regionwide respectively.

WASTEWATER RECLAMATION AND REUSE

Reclamation and reuse of wastewater is not a new concept. Although it has never played more than a minor role in the Bay Area's water supply plans, its use dates back many years. Since 1932 Golden Gate Park has used treated wastewater for landscape irrigation and recreational lakes.

In 1976 there were over 200 wastewater reuse projects in operation in California; only ten of these were in the Bay Area. One reason that reuse has not been extensively practiced in this area is that the larger sewage treatment plants are located in areas somewhat remote from potential markets for reclaimed water. Another reason is that the sewage was inadequately treated for reuse purposes. In the last five years however, higher treatment levels have been added at many plants; production of a higher quality effluent has made reuse a more attractive option and the number of reuse projects in the Bay Area is growing steadily.

Table 4.

WATER USE BY SUB-REGION IN THE YEAR 2000
(million gallons per day)

Subregion	Without Conservation	Conservation Alternative A	Conservation Alternative B
East Bay	585	525	512
Peninsula	226	208	203
South Bay	473	420	408
Napa-Solano	486-545	402-451	397-446
Marin-Sonoma	181	161	155
Regional Total	1951-2010	1716-1765	1675-1724
Water Saving	0	235-245	276-286

Limitations on Use of Reclaimed Wastewater

Because of its origins the possibility exists that reclaimed wastewater may contain bacteria, viruses or other substances harmful to man. Treatment processes, however elaborate, cannot be made completely foolproof. Although the risk of infection is probably slight, the present water supply situation in California is not sufficiently desperate to justify taking even a slight risk. Consequently use of reclaimed wastewater is restricted by State Health Department regulation to those uses that do not involve human ingestion.

Within the Bay Area the most promising reuse options are agricultural irrigation of certain types of crops, landscape irrigation and industrial use for cooling purposes. Permissible but less promising options include creation of artificial lakes, marsh enhancement and groundwater recharge when little or no chance of use of groundwater for drinking water supply exists.

Pilot studies are being initiated in Monterey County to determine whether reclaimed wastewater can be used to irrigate leafy food crops such as lettuce and artichokes. If it is proved that this can be done safely, then some of the limitations on agricultural reuse may be removed.

Markets for Reclaimed Water

Few, if any water users would choose to use reclaimed wastewater if another source was available at the same cost. As a consequence markets for reclaimed water are not always easy to find.

No new work on the identification of future reuse markets was done during the preparation of this plan. Virtually every agency responsible for sewage service has conducted an analysis of reuse opportunities within its own service area as a prerequisite to receipt of a State or Federal grant for construction of sewage collection, treatment or disposal facilities. These study reports were reviewed and a large number of potential reuse project identified. Those projects which met certain financial, technical and environmental criteria were determined to be feasible and likely to be built. The capacity of the projects represents the probable market for reclaimed wastewater in the region.

Figure 3 shows how the market for reclaimed wastewater is expected to grow between now and the year 2000. Some of the major projects that are either under construction or planned in the region are described below.

On the Peninsula there are several golf courses and parks close to the sewage treatment plants which can be irrigated with reclaimed wastewater. Additionally there are crops in the Half Moon Bay Area that could be irrigated. In Santa Clara County a salt water intrusion barrier is being formed with tertiary treated effluent from the Palo Alto Treatment Plant. The project could be expanded in the future. Reuse by agriculture is planned in the Gilroy and Milpitas areas.

The largest reuse project in the Bay Area is the Central Contra Costa Sanitary District and Contra Costa County Water District's reuse project of 15 mgd for industrial cooling water in the Martinez area. Most of the project is already built. A market for an additional 15 mgd of industrial process water exists in the same area and the present project will probably be expanded. A similar project involving 11 mgd is being studied by EBMUD in the Richmond area that

would combine industrial reuse and reuse for landscape irrigation. Additional landscape irrigation demand exists near the San Leandro treatment plant and in the Union City area near the Union Sanitary District's plant.

In Marin County one landscape irrigation project is on-line at Los Gallinas and others are planned in Mill Valley and Lower Ross Valley. Agricultural irrigation with reclaimed wastewater appears, from initial pilot scale testing, to be possible in the Novato area. A considerable amount of reuse for agricultural irrigation in Sonoma County is planned. The City of Santa Rosa, Petaluma and the Sonoma Valley area are all actively pursuing projects that will reuse initially all wastewater generated in the summer growing season for pasture and field crop irrigation. This project is known as the triple use project because it combines waste disposal, fodder irrigation and open space preservation.

Similar projects are already on-line in northern Napa County. The Napa County Sanitation District and the American Canyon County Water District have expressed an interest in using reclaimed wastewater in the Carneros area for crop irrigation and vineyard frost protection. A joint agricultural irrigation - marsh enhancement project is being implemented in the Fairfield area. The City of Vacaville is negotiating with the Solano Irrigation District over summer reuse for crop irrigation.

All in all there is currently much interest in wastewater reclamation. The drought has had the effect of speeding up some of these projects and creating some new ones on an emergency basis. It is important to stress that realization of this potential reuse market will require continued serious efforts to secure contracts or commitments from potential customers to promise to take the reclaimed wastewater on a long-term basis and monies from grants and/or other sources to build the projects.

Reclaimed Wastewater As A Water Supply Source

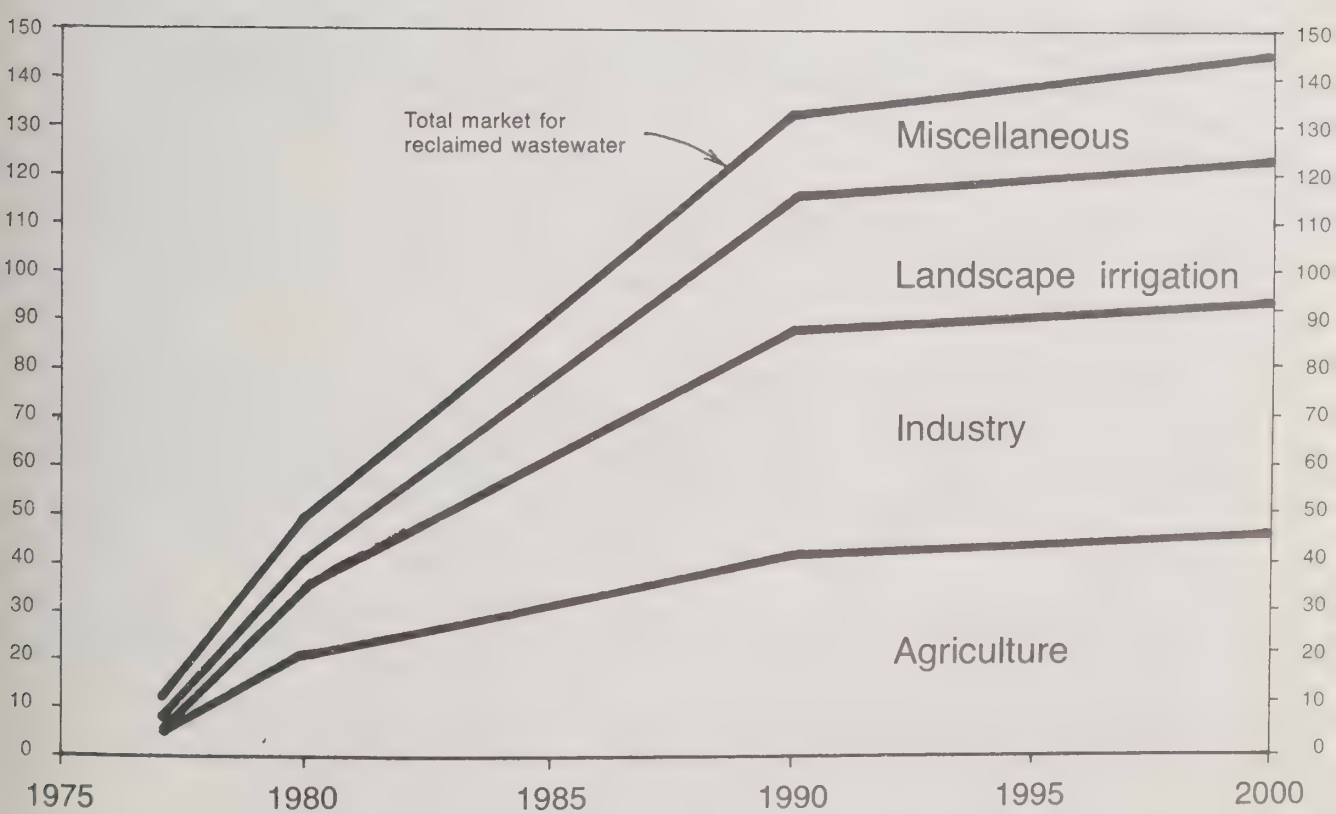
The markets for reclaimed wastewater fall into two categories; situations where reclaimed wastewater is used to replace water that would otherwise have been obtained from another source and situations where the availability of reclaimed wastewater creates a market which would not otherwise have existed. Obviously satisfying the second type of market with reclaimed wastewater does not reduce total water demand. Figure 3 shows the total market for reclaimed wastewater in the year 2000 is 143 mgd. Only 77 percent or 110 mgd of this represents a reduction in regional water demand.

DEVELOPMENT OF NEW SOURCES

A number of large projects are in the initial stages of construction or are proposed. If completed they will increase available water supply to approximately 2400 mgd during a dry period comparable with

Figure 3.

Markets for reclaimed wastewater



that experienced in 1928 through 1935. During a drought like the current one, the supply would be less. The construction of all the proposed projects is not certain. All the projects are opposed by some environmental groups and several are the subject of litigation.

An expansion of the Hetch Hetchy aqueduct is proposed which would allow San Francisco Water Department to import an extra 100 mgd for use in San Francisco, San Mateo, Santa Clara and Alameda Counties.

The East Bay Municipal Utilities District has contracted with the U. S. Bureau of Reclamation for approximately 134 mgd of American River water. A new aqueduct extending from the Folsom South Canal to Walnut Creek is proposed to bring this water to the Bay Area.

The San Felipe Division of the Central Valley Project has been designed to supply water to Santa Clara, San Benito, Santa Cruz and Monterey counties. At capacity the project will bring 134 mgd to Santa Clara County. Construction has begun and will extend to 1983 when the first water deliveries are scheduled.

The Warm Springs Dam on a tributary of the Russian River is being built by the U. S. Army Corps of Engineers. Preliminary site work is proceeding but work on the structure itself is held up by litigation. The dam would allow an extra 102 mgd to be withdrawn from the Russian River for use in Marin and Sonoma counties.

The State Department of Water Resources intends to build the North Bay Aqueduct in the early 1980s to deliver Sacramento River water to Solano and Napa counties. A maximum of 55 mgd has been contracted for.

The U. S. Bureau of Reclamation plans to study the feasibility of a West Sacramento Valley Canal Unit which if built could deliver 120 mgd to Solano County. It appears unlikely that this project will be built before the year 2000 and consequently it was not considered in the subsequent analysis of supply and demand.

COST COMPARISON

Estimates of the cost of matching supply and demand in different ways were made and are shown in Table 5. The estimated costs should be regarded as approximate because they were derived from many sources which have used different assumptions and calculation procedures. They do, however, provide a rough basis for comparison.

The least expensive water is produced by "moderate" residential conservation. Agricultural conservation, subsidized wastewater reclamation and development of new sources are all within the same cost range. "Maximum" residential conservation and unsubsidized wastewater reclamation are more expensive in most cases.

Table 5.

ESTIMATED COST OF WATER OBTAINED FROM VARIOUS SOURCES^a

Source	Cost ¢/1000 gallons
"Moderate" Residential Conservation	2-5
Agricultural Conservation	14-25
Subsidized Wastewater Reclamation ^b	5-30
New Sources ^c	10-30
Warm Springs ^d	10
Hetch Hetchy ^e	15
North Bay Aqueduct ^f	22
San Felipe ^g	24
American River ^h	30
"Maximum" Residential Conservation	15-45
Unsubsidized Wastewater Reclamation	15-60

^a All costs in 1977 dollars, ENR Index=3100

^b Certain types of wastewater reclamation facilities are eligible for Federal and State grants.

^c Costs include cost of purchasing water (if any), reservoir construction and conveyance cost to Bay Area.

^d Source: Sonoma County Water Agency. Costs updated using ENR Index.

^e Source: "Draft Master Water Plan for San Mateo County," March 1977.

^f Source: California Department of Water Resources Bulletin 132-76.

^g Sources: "The Water Utility Enterprise, Final," March 1977, and "Master Plan Expansion on In-County Water Distribution System," December, 1975 Santa Clara Valley Water District.

^h Source: Letter dated July 18, 1977 East Bay Municipal Utility District to J. B. Gilbert and Associates.

Section-E

THE REGIONAL SUPPLY AND DEMAND SITUATION

It is always difficult to develop a convincing picture of how water demand and supply will match in the future. Many uncertainties enter into the projections. In this instance, the routine difficulties are compounded by the fact that we recently experienced a severe drought, the full implications of which have yet to be analyzed. For this reason this chapter describes two demand/supply scenarios or possible futures. The description is prefaced by a discussion of how the drought affects projections.

THE EFFECT OF THE RECENT DROUGHT

The drought affects water supply and demand projections in two ways: first it changes our estimates of the amount of water existing and planning systems can reliably deliver; and secondly, it alters patterns of water use in ways which may persist once the drought is over.

Safe yield and the drought

The capacity of a water supply system to deliver water is expressed in terms of the safe yield. The safe yield is the amount of water the system can deliver in the driest period of record. Safe yields for surface waters and groundwaters are different. The safe yield of surface water supplies is based on what could have been delivered during the 1928 to 1935 drought. The safe yield of groundwaters is the long-term average annual recharge; that is the amount of water averaged over a number of years that goes back into the groundwater body as a result of rainfall or man's activities such as crop irrigation or artificial recharge.

It is apparent that the 1976-77 drought was more severe than that experienced in 1928 to 1935. Now the drought is over and the reservoirs are full again, it is necessary to revise downwards the safe yield estimates for both existing and planned surface water supplies. This reevaluation of safe yields is not yet complete.

Water use patterns

Public response to water agency requests to reduce water consumption during the drought was dramatic. In many areas actual performance has substantially exceeded the goals of the individual savings programs. Examples are cuts in water use of 65 and 42 percent respectively in Southern Marin and the Contra Costa County Water District service area.

Much of the savings results from changes in human behavior. Most of these changes in habits--not running water while brushing teeth, not using the toilet to dispose of facial tissues, etc.--do not cause much,

if any inconvenience. Some suburban homeowners may have discovered that time previously spent on the care and maintenance of the yard can be spent more enjoyably in other ways. Overall it seems unlikely once the drought is over that individual water use will immediately, if ever, revert back to its pre-drought rate. Measured water use in many parts of the region in the spring and early summer of 1978 support this hypothesis.

A part of the analysis supporting this plan involved projecting future water demand assuming no water conservation. Because of the drought, at least some conservation will continue. Thus reality is unlikely to bear out the "no conservation" demand curve.

THE SUBREGIONAL SITUATION

The facilities to move water from any of the region's sources to any area within the region that needs water do not exist. Consequently, there are subregional variations in the demand/supply situation within the region. The subregional situation is discussed below with reference to two possible demand scenarios. Both scenarios assume a regional population of 6.1 million in the year 2000--the high end of the Series 3 projection range. The discussion of the subregional differences is followed by some speculations on how better intra-basin distribution of water might solve some subregional imbalances and lead to more efficient use of water sources available to the region. Table 6 shows the reserve capacity each subregion has now and in the future under each scenario.

New Drought Scenario

This scenario pictures the post-drought situation assuming no changes in present water supply planning practices. In keeping with past practice the safe yields of existing and planned surface water supplies are revised downward to that amount of water they can reliably deliver in the driest years of record, now 1975 through 1977. This is assumed to be 74 percent of the pre-1975 surface water safe yields. The percentage reduction was estimated by one water agency in the region and is not concurred with by others. In the absence of any other data it was used here. When the full effects of the drought have been evaluated this analysis will have to be repeated using more accurate information.

Considering Table 6, it is apparent under the New Drought Scenario that, although the region as a whole has a supply shortfall of only 3 percent, Marin/Sonoma and Napa/Solano have supply shortfalls of 17 percent while the East Bay has a 15 percent reserve. In the year 2000, assuming no conservation and reclamation, the region still has a shortfall of about 6 percent. Napa/Solano and South Bay subregions both exhibit deficits. If conservation and reclamation is implemented all subregions will have some reserve capacity except Napa/Solano. The region as a whole would have a 14 percent reserve.

Old Drought Scenario

The basis for the Old Drought Scenario is that, once the current drought is over, a determination is made that the 1975-77 drought was an extremely unusual phenomenon--one that is unlikely to recur again in the next one hundred years. It is decided that water supply systems should not be designed to deliver unrestricted water during such a severe drought. Better to put up with the possibility that water might have to be rationed in the

Table 6.

Water demand/supply situation by subregion

Subregion	1975 Demand mgd	Reserve Capacity ^a - percent					
		New Drought Scenario			Old Drought Scenario		
		1975	2000 No conserv/ reclamation	2000 with conserv/ reclamation	1975	2000 No conserv/ reclamation	2000 with conserv/ reclamation
Peninsula	204	-8	5	20	22	40	60
South Bay	359	-10	-11	5	1	9	28
East Bay	475	15	9	33	46	42	77
Marin/Sonoma	131	-17	8	22	-6	32	49
Napa/Solano ^b	441	-17	-40	-15	1	-10	6
Region	1610	-3	-6	-14	15	16	43

^aEstimates of reserve capacity are based on a regional population of 6.1 million in the year 2000 and do not assume compact development. If compact development is implemented reserve capacities will increase by 1 to 3 percentage points.

^bAssuming Bureau of Reclamation estimates of future demand in Solano County.

in the unlikely event of a recurrence rather than spend money on rarely, if ever used, facilities. Accordingly, conventional water supply planning practices are modified. Water supply systems continue to be designed to provide unrestricted water during a less severe drought, the 1928-35 drought. For this reason the safe-yields or deliverable supply of existing and planned systems are also based on the 1928-35 drought. In most respects the Old Drought Scenario is similar to the supply-demand picture that would exist had the current drought never occurred.

From Table 6 it is clear that the only subregion with a supply shortfall in 1975 is Marin/Sonoma. If all planned water projects are built the regional reserve capacity will rise to 16 percent without conservation and reclamation and to 43 percent with conservation and reclamation. Without conservation and reclamation reserve capacity will vary from 42 percent in the East Bay to a 10 percent deficit in Napa/Solano. In the absence of system interties and assuming all planned water supply projects are built conservation and reclamation would only be necessary in Napa/Solano.

THE REGIONAL SITUATION

The following speculative analysis assumes that the facilities exist to distribute water to wherever it may be needed in the region, somewhat in the manner of the existing electrical power distribution system. This is not the case at present. The concepts of the Old and New Drought Scenarios and the assumptions they depend on are retained in the discussion of the region as a whole. The regional water demand/supply situation is summarized in Table 7.

New Drought Scenario

If the New Drought Scenario presents a credible representation of reality then it follows that in 1977, if no conservation or reclamation were practiced, supply would fall short of demand by about 50 mgd or 3 percent. In the year 2000, if no conservation or reclamation were practiced, supply would still fall short of demand by about 6 percent despite the construction of five major and several minor water supply projects. Even if water conservation Alternative A and wastewater reclamation, to the extent described earlier, are practiced fully, a reserve capacity of only about 14 percent is produced. Bearing in mind that at most times some reserve is desirable because major water supply projects take many years to build, full implementation of conservation and reclamation under the New Drought Scenario might justify slightly delaying construction of some new projects; the projects would clearly still be needed, however.

Old Drought Scenario

To reiterate the Old Drought Scenario assumes that the current drought is a rare phenomenon--not likely to recur in the next one hundred years. The safe yields of our water supply systems remain based on the 1928-35 drought.

If all presently planned supply projects were built and water conservation and wastewater reclamation practiced extensively the region would have a reserve capacity of 43 percent. Clearly more than enough. The possibility that some of the presently planned projects need not be built obviously exists. Such a conclusion only holds however if it is

Table 7

REGIONAL WATER DEMAND/SUPPLY SITUATION

	New drought scenario	Old drought scenario
Water demand (1975), mgd	1610	1610
Existing deliverable supply (1977), mgd	1560	1860
Estimated water demand (2000), mgd	2013	2013
Planned deliverable supply	1900	2385
Reserve capacity (1975)	-3	15
Reserve capacity without conservation and reclamation	-6	16
Reserve capacity with conservation and reclamation (2000)	14	43

assumed that water can be distributed freely within the region by means of system interties.

System Interties

System interties appear to be worthy of serious consideration for two reasons. First, the regional differences in water supply assurance described above could be evened out. Secondly, and more importantly, interties could lead to more efficient use of our existing sources and a reduced need to develop new ones. This can be illustrated as follows with reference to the New Drought Scenario in the year 2000 assuming conservation and reclamation have been implemented. If it is assumed that a 15 to 20 percent reserve capacity is desirable, then both the South Bay and Napa-Solano subregions would have a less than desirable reserve. On the other hand the East Bay and, to a lesser degree, the Peninsula and Marin/Sonoma would have ample reserves. If interties were built reserves could be shared, resulting in a satisfactory regional reserve capacity of about 15 percent. In the absence of interties both the South Bay and Napa-Solano subregions would likely develop independent new sources which, viewed from a regional perspective, are not necessary. It should be noted that even if interties are shown to be technically and economically desirable, institutional constraints to their implementation will still exist. Constraints affecting exchange of water include the enabling acts under which water agencies operate and water rights considerations. Transfer of water from one agency to another could necessitate re-negotiation of existing water contracts which could lead to a loss of water to the region as a whole.

Section-F

PLAN RECOMMENDATIONS

The recommended water conservation, reuse and supply plan consists of a list of principles or policies that will guide water supply planning in the future. Each policy is accompanied by a series of actions designed to implement the policy.

Table 8 lists the plan recommendations. The policies and their implementing actions are listed in the first column headed recommendations. For each action subsequent columns of the table show the agencies responsible for implementing the action, the implementation schedule, legal authority of the agency to implement the action, cost, source of funding, measures to ensure implementation and the environmental, institutional/financial, economic and social impacts of the action.

The purpose of the following narrative is to serve as an aid to understanding the contents of the table.

Policy	<u>Provide a safe and reliable water supply to all citizens at a minimum monetary and environmental cost.</u>
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This policy simply restates the principle that has guided most of the region's water supply agencies in the past. Compliance with the latter part of the policy "at a minimum monetary and environmental cost" makes interagency cooperation a necessity, a fact that is reflected in the following actions.

Actions

Probably the most important recommendation contained in this plan pertains to the formation of a water management coordinating committee (WMCC). The committee, which would initially be organized informally and perhaps later formalized by a joint powers agreement, would provide the forum for discussion and possible resolution of issues of mutual interest to agencies concerned with water management. The committee will include representatives of both the water and wastewater agencies. Although some of the matters before the committee will concern only one or the other type of agency it appears preferable to form a single committee rather than two because this better reflects the interrelationships between water supply and wastewater disposal.

Several studies or planning activities of mutual interest to water agencies are recommended for consideration by the WMCC. Recommended studies include an evaluation of the feasibility of increased interagency transfers under both routine and emergency conditions. A reexamination of the desirability of supplying unrestricted water to all consumers, even under the worst conditions which may occur very infrequently, is recommended. The preparation of interagency-coordinated drought contingency plans is recommended.

It is clear that the region will need at least some new water supply facilities in the future. The facilities will include those needed to develop new sources and probably some additional interties between existing systems. Construction of needed facilities is recommended in this plan. The exact nature of the facilities cannot be determined until the drought is over and the WMCC has completed the recommended studies. In order to mobilize local and regional government support for any new construction projects, it is proposed that WMCC keep ABAG's Regional Planning Committee informed of progress in water supply planning. RPC approval of a particular project should improve its chance for implementation.

Several actions are recommended to prevent future groundwater pollution problems such as saltwater intrusion and high-nitrate levels resulting from septic tank discharges.

Policy Encourage water savings

It is apparent that the least expensive way to progress toward matching water supply and demand is to reduce residential demand to a moderate degree. Clearly it is in the region's interest to do this. More intensive residential water saving and agricultural water conservation are no more costly than development of new sources of water and have few, if any adverse, environmental effects. Both of these options are promising but need further evaluation.

Actions

It is recommended that water agencies establish or continue water savings programs that include residential measures similar to those described earlier as the "moderate" water savings plan. The "moderate" plan encourages retrofit of water saving devices in existing housing and mandates building-in water saving devices in all new construction. Building codes should be updated to include water saving devices over and above those already required by State law. The building industry is already voluntarily installing water saving devices in some areas.

Studies should be conducted under the direction of the WMCC to determine the public acceptability of more stringent residential water saving and the feasibility of agricultural water conservation. More stringent residential water savings might involve restrictions on certain types of landscaping and landscape irrigation methods. Agricultural water saving may be infeasible unless it is part of a statewide program.

Actions are recommended to encourage water saving by providing tax incentives for retrofitting of water saving devices such as low-flush toilets in existing homes and by revising water rate structures that result in lower unit costs to large water users.

Effective water conservation depends on a high level of public awareness of the consequences of wasteful water use. It is recommended that this be maintained at least in part by a regionally coordinated public information program and by annual reporting of progress in the water saving field.

Policy Encourage reuse of wastewater where cost-effective

The unsubsidized cost of reclaimed water is usually higher than the cost of water from new sources. Monetary costs, however, do not take account of the fact that using water twice has a much smaller adverse environmental impact than developing new sources. Federal and State grants are available to pay part of the construction cost of wastewater reclamation and reuse facilities. Because of this subsidy, the local cost of reclaimed water is reduced, making it competitive with other water sources. It appears to be in the region's interest to construct all reclamation projects that will produce water that is price-competitive with other sources.

Actions

It is recommended that the proposed regional wastewater reclamation study be conducted as soon as possible. The study is intended to determine whether large-scale reclamation of Bay Area wastewaters for use by agriculture in the Central Valley is feasible and if any sub-regional reclamation opportunities exist other than those already being pursued by local agencies. A study of this type has been planned for some time and appear likely to commence shortly under the direction of a joint powers agency made up of major water and sewerage agencies and funded in part by the State and Federal through the Clean Water Grants Program. The joint powers agency could form the nucleus of the WMCC.

As noted earlier, State and Federal funds are available to supplement local funds in paying for the cost of construction of wastewater reclamation facilities. It is recommended that priority for grant funding can be given to reclamation projects that produce water that replaces an existing use.

TABLE 8

**Water Supply
Management Plan**

recommendations

Water Supply Management Plan recommendations

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL * COST/YEAR OF RECOMMENDED ACTION	PORTION OF * TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 1

PROVIDE A SAFE AND RELIABLE WATER SUPPLY TO ALL CITIZENS AT A MINIMUM MONETARY AND ENVIRONMENTAL COST.

* This column presents annualized costs. The annualized cost is the amount of money per year that would amortize the total cost of the program over the period 1978-2000 at a 6-3/8% interest rate.

Action 1.1

Establish water resource management coordinating committee (WMCC).

The WMCC is requested to consider the following:

- Evaluate the advantages and disadvantages of increased interagency water transfer.
- Evaluate the costs and benefits of accepting restrictions on water use during droughts.
- Evaluate need for new water supply projects, including interties, prior to

Initially the WMCC will include management representatives of all major water agencies in the Bay region. The goal will be to meet as an informal committee to discuss and define the region's need for cooperative water supply management and to determine whether a permanent organizational structure and what membership would be appropriate for an ongoing regional effort. The committee will include at least one agency from each county. In counties where there is no single major agency the agencies in each county will determine their method of representation on the WMCC.

WMCC

July 1978

Informal coordination followed by possible joint exercise of powers agreed to be decided by WMCC.

Undetermined

Undetermined.

To be determined by WMCC; may be dues paid by committee members or contribution of individual agency's staff time.

Voluntary

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o See actions. <u>Water Quality and Quantity</u> <ul style="list-style-type: none"> o Should assure adequate supplies of high quality water. o Specific projects may adversely and beneficially affect water quality and quantity of sources. <u>Physical Resources</u> <ul style="list-style-type: none"> o Provision of water supplies affects supply and use of land related resources (agriculture, wildlife habitats). o Provision of water supplies can increase agricultural productivity over that of dry-land farming. <u>Energy</u> <ul style="list-style-type: none"> o Water projects require energy for construction and operation of facilities and water distribution. o Development accommodated may indirectly increase local energy demands. o Supply and transfer projects may augment energy supplies. <u>Amenities</u> <ul style="list-style-type: none"> o Irrigated landscaping provides aesthetically pleasing surroundings in areas such as parks, golf courses, highway rights-of-way, yards. 	<u>Financial</u> <ul style="list-style-type: none"> o May require capital investments for necessary facilities. <u>Institutional</u> <ul style="list-style-type: none"> o May require intergovernmental cooperation (Joint Powers Agreements, Memoranda of Understanding) and additional legal capabilities. 	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Assures continued production by businesses dependent upon adequate fresh water supplies. o Assures continued agricultural production on irrigated land. <u>Income and Investment</u> <ul style="list-style-type: none"> o May require investment funds for capital facilities. o Promotes healthy economic climate which attracts investment funds. o Aids in maintaining income by assuring production will not be restricted due to lack of water supplies. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Change (increase vs. decrease) in water prices would vary and should be considered in decisions on supply and transfer projects. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o May accommodate increased housing starts in areas that were limited by water shortage. <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impacts. <u>Health and Safety</u> <ul style="list-style-type: none"> o Promotes health of population through provision of safe water supplies. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impacts. <u>Equity</u> <ul style="list-style-type: none"> o No impacts. <u>Urban Patterns</u> <ul style="list-style-type: none"> o Adequate water supplies favor irrigated agriculture over dry-land farming and grazing.
<div> <p>Note: Impacts presented with policy are common to all actions under that policy.</p> </div>			

Impacts same as noted for Policy 1.

Financial

Direct Public Cost of Implementation

- o Undetermined but small

(Total cost to local water supply agencies to maintain committee.)

Institutional

- o Requires cooperation of numerous water supply agencies.

Impacts same as noted for Policy 1.

Impacts same as noted for Policy 1.

WATER SUPPLY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
<p>1985 giving priority to water conservation and reclamation.</p> <p>d. Prepare a drought contingency plan.</p> <p>e. Conduct survey of status, use and plans for all groundwaters in region.</p> <p>f. Prepare regional groundwater basin management plan.</p> <p>g. Evaluate the quality of water for domestic use including an examination of the effect of further withdrawals of freshwater from the Delta and impacts which percolation of imported water may have on quality of underground water supplies in the region.</p>	<p>For items "e" and "f", the General Assembly requests specific consideration (and a report back to it) of the implications, costs and advisability of the proposed studies.</p>							

Policy 2

ENCOURAGE WATER SAVING.

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o No impacts.

Water Quality and Quantity

- o An estimated 6.5% reduction in water use by existing development or an average of 1.7 gpcd with moderate conservation practices. n 1-
- o Estimated 21% reduction in water needs of new developments or an average of 16.6 gpcd savings. g s on.
- o With moderate conservation practices existing supplies could serve greater population as approximately 120 mgd water could be saved by the year 2000.
- o Suitability of wastewater for reclamation and reuse is reduced.

Physical Resources

- o If the need for new storage facilities is reduced by conservation practices, the adverse effects on the physical resource base due to supply development would be eliminated.

Financial

- o See actions.

Institutional

- o May require additional legal capabilities (new legislation) to implement.
- o Would require revisions in building codes.
- o May require renegotiation of contracts between wholesalers and distribution agencies as current contracts and price structures do not encourage water conservation.

Energy

- o Reduced demand for energy necessary to supply water; 10% reduction in water use could result in a 5-10% reduction in energy use.

Amenities

- o Effective water conservation would require changes in outside water use for residential, commercial and recreational purposes.

Production of Goods and Services

- o Increase in production of water conserving devices.
- o Increased need for plumbing services to repair old systems.
- o Agricultural production costs may decrease as water saving practices are used; an estimated 100,000 acre feet per year could be saved or 100 mgd in the year 2000.

Income and Investment

- o Initial capital investments would be necessary for an effective conservation program unit costs for Bay Area agriculture would be approx. 49¢/acre-ft. or 15¢/kgal.

- o Farmers implementing conservation measures will suffer less from future ultimate water shortages.

Urban Patterns

- o No impacts.

Housing Supply

- o Existing housing costs should not be affected--retro-fitted conservation devices average \$1/home.
- o Increased maintenance of older and substandard homes.
- o Minor cost increase to new homes; moderate conservation practices could mean \$30/unit.

Physical Mobility

- o No impacts

Health and Safety

- o No impacts

Sense of Community

- o No impacts

Equity

- o Agricultural conservation costs may put Bay Area farmers at comparative but temporary disadvantage.

WATER SUPPLY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 2.1 Implement residential water savings programs in existing developments including homes, businesses, industries and recreational areas	"Moderate" residential water savings programs emphasizing retrofit of water saving devices are recommended. 5-10% savings can be achieved in this way.	Water supply agencies/homeowners, private companies.	Dec. 1978	Water agency enabling legislation	\$1,420,000 Costs are for actions 2.1 & 2.2.	\$1,240,000	User charges and private funds	Voluntary
Action 2.2 Implement water savings programs in new developments, including homes, businesses, industries and recreational areas.	"Moderate" water savings programs emphasizing the building-in of devices into new construction are recommended. 10-20% savings can be achieved in this way.	Water supply agencies, developers, private companies, public institutions	Dec. 1978	Water agency enabling legislation.	Included in 2.1.	Included in 2.1	User charges and private funds.	Voluntary
Action 2.3 Revise and update building codes to include water saving devices in new construction.		Cities, counties and International Conference of Building Officials.	Continuous from Dec. 1978		Undetermined.	Undetermined.	City and county funds	In part voluntary, in part required by State law.
Action 2.4 Evaluate need for regionally coordinated public information/education program.		WMCC	Dec. 1978		Undetermined	Undetermined	WMCC funds (See action 1.1.)	Voluntary

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 2.	<u>Financial</u> <ul style="list-style-type: none"> o Uncalculated cost for public agencies to reduce their water use. <u>Institutional</u> <ul style="list-style-type: none"> o Water supply agencies would need to promote conservation programs. 	<u>Consumer Expenditures</u> <p>Direct Private Cost of Implementation</p> <ul style="list-style-type: none"> o (1980) \$1.00/household o (1980) \$1,770,000 (estimated total cost of flow restrictors on existing housing). <p>Other economic impacts are the same as noted for Policy 2</p>	Impacts same as noted for Policy 2.
Impacts same as noted for Policy 2.	Impacts same as noted for Action 2.1.	<u>Production of Goods and Services</u> <p>Employment - a small employment increase of less than 80 for the manufacture and installation of water conserving devices.</p> <u>Income and Investment</u> <ul style="list-style-type: none"> o No impacts. <u>Consumer Expenditures</u> <p>Direct Private Cost of Implementation</p> <ul style="list-style-type: none"> o \$30 per new dwelling unit for installation of moderate plan conservation devices. o (1975-2000) \$26,680,000 (estimated total cost to new housing). 	Impacts same as noted for Policy 2.
Impacts same as noted for Policy 2.	<u>Financial</u> <p>Direct Public Cost of Implementation</p> <ul style="list-style-type: none"> o (1978) \$45,000 (estimated cost to change building codes). o These activities fall within normal duties of city and county government. <u>Institutional</u> <ul style="list-style-type: none"> o City and county governments must investigate devices and pass appropriate ordinances. 		Impacts same as noted for Policy 2.
Impacts same as noted for Policy 2.	<u>Financial</u> <p>Undetermined.</p> <u>Institutional</u> <ul style="list-style-type: none"> o No impacts. 	<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Potential tax incentives can mean temporary savings to consumers. <p>Other economic impacts are the same as noted for Policy 2.</p>	Impacts same as noted for Policy 2.

WATER SUPPLY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 2.5 Enact legislation to provide incentives for retrofitting water saving devices in existing homes, businesses, etc., and for conserving agricultural water.		State Legislature/US Congress	Continuous from Dec. 1978	State and Federal constitutions	Undetermined.	Undetermined.	Federal and State budgets.	ABAG advocacy
Action 2.6 Make public as economically as possible data on annual water use and conservation in the region.		WMCC/ water agencies, DWR, media	Annually		Undetermined	Undetermined		
Action 2.7 Evaluate changing water rate structures to encourage water saving.		WMCC to consider, water agencies to act.	Dec. 1978	Water agency enabling legislation.	Undetermined.	Undetermined	User charges.	Voluntary
Action 2.8 Encourage agricultural water conservation program.	Water could be saved if farmers adopted more efficient irrigation methods. It would only be feasible on a State-wide basis, so State legislation would be necessary.	State Legislature		State constitution	Undetermined	Undetermined	Improvements to irrigation systems would be financed with private funds.	Voluntary

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
Impacts same as noted for Policy 2.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o Uncalculated cost of enacting legislation o Government revenues lost to tax incentives may ultimately be recouped in other taxes. o If legislation features tax incentives -- the cost to government is uncalculated. Institutional impacts are the same as noted for Policy 2	<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Potential tax incentives can mean temporary savings to consumers. Other economic impacts are the same as noted for Policy 2.	Impacts same as noted for Policy 2.
Impacts same as noted for Policy 2.	<u>Financial</u> Direct Public Cost of Implementation <ul style="list-style-type: none"> o Undetermined o Ultimate funding source is water charges paid to water agencies. <u>Institutional</u> <ul style="list-style-type: none"> o No impacts. 	<u>Consumer Expenditures</u> <ul style="list-style-type: none"> o No impacts Other economic impacts are the same as noted for Policy 2	Impacts same as noted for Policy 2.
Impacts same as noted for Policy 2.	<u>Financial</u> Small public cost for needed studies <u>Institutional</u> <ul style="list-style-type: none"> o No impact. 	No impacts	Impacts same as noted for Policy 2.
<u>Water Quality and Quantity</u> <ul style="list-style-type: none"> o Estimated 15% saving in projected year 2000 agricultural water needs or 30% reduction in use over no conservation reductions. Other environmental impacts are the same as noted for Policy 2.	<u>Financial</u> <ul style="list-style-type: none"> o No impacts. <u>Institutional</u> <ul style="list-style-type: none"> o Reduced demands upon water supplied by irrigation districts. 	<u>Consumer Expenditures</u> Direct Private Cost of Implementation <ul style="list-style-type: none"> o (1980) \$62,800,000 (estimated capital expenditures by farmers). o Increased prices of farm products unless conservation savings offset potentially higher cost of water in future. Other economic impacts are the same as noted for Policy 2.	Impacts same as noted for Policy 2.

WATER SUPPLY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 2.9 Establish a program to promote landscaping appropriate to the Bay Area climate.	Plants native to the Bay Area are adapted for survival in the prevailing climate. They do not require large quantities of water. This action might be implemented as part of a regionally coordinated public education/information program. (See Action 1.1.)	WMCC, water agencies	Dec. 1978		Undetermined	Undetermined		Voluntary

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Water Quantity</u> o Long-term reduction in demand for landscape irrigation water.	<u>Financial</u> Small public cost for education/information program.	No impact	Impacts same as noted for Policy 2.

WATER SUPPLY MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 3

ENCOURAGE SAFE AND COST-EFFECTIVE WASTEWATER RECLAMATION

Action 3.1

Conduct regional reclamation study.

Joint powers agency already being formed

Nov. 1977

Porter-Cologne Act & Federal Water Pollution Control Act

\$2 million for 3-year study.

-0-

Already budgeted. EPA & State grants.

Action 3.2

Construct cost-effective wastewater reclamation projects.

Wastewater agencies

Continuous

\$10,200,000

-0-

EPA and State grants, user charges and revenue from sale of water.

Action 3.3

Expedite studies and standard setting for use of reclaimed wastewater for recharge and other purposes.

State Health Dept.

Continuous

Health & Safety Code.

Undetermined

Undetermined

Budget action by State Legislature.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> <ul style="list-style-type: none"> o No impacts. <u>Water Quality and Quantity</u> <ul style="list-style-type: none"> o Relieves higher quality water supplies for more demanding purposes--e.g., potable supplies. o With reclamation, existing and proposed water supplies can serve greater population. o Total amount of water ultimately saved by reuse in Bay Area would be approximately 100 mgd. <u>Physical Resources</u> <ul style="list-style-type: none"> o Reclaimed waters can be used to develop new agricultural lands and to supplement irrigation necessary for lands currently in production. o Reclaimed water could be used for groundwater recharge, marsh enhancement and recreational lakes. 	<u>Financial</u> <ul style="list-style-type: none"> o See actions. <u>Institutional</u> <ul style="list-style-type: none"> o Requires cooperation of local, regional and state agencies. o Requires supportive regulations from State Health Department. <u>Energy</u> <ul style="list-style-type: none"> o Energy is consumed in advanced treatment of wastewater for reclamation (5 mgd plant uses approximately 360,000 kw hrs. electricity in a 6 month period). o Energy needs for distribution of reclaimed water may be lower if alternative is importing water over long distances. o 10% reduction in water use yields 5-10% reduction in energy use. <u>Amenities</u> <ul style="list-style-type: none"> o Irrigating parks, golf courses and highway rights-of-way with reclaimed water frees potable water for other uses. 	<u>Production of Goods and Services</u> <p>Employment- Possible increase in employment as a result of development of markets for reclaimed water--certain increase in treatment plant operator employment.</p> <u>Income and Investment</u> <ul style="list-style-type: none"> o Increase in wages for those affected by employment increase. o Increase in income of some engineering firms. o Increased investments for water reclamation facilities and distribution systems. <u>Consumer Expenditures</u> <ul style="list-style-type: none"> o Increased availability of water supplies to agriculture and industry may keep production costs and consumer prices down. <u>Urban Patterns</u> <ul style="list-style-type: none"> o No impacts. 	<u>Housing Supply</u> <ul style="list-style-type: none"> o Increased water supplies to agriculture and industry may release potable supplies for domestic use. o Increased potable supplies in water short areas might permit new housing starts. <u>Physical Mobility</u> <ul style="list-style-type: none"> o No impact. <u>Health and Safety</u> <ul style="list-style-type: none"> o No impacts if reclaimed water is adequately treated. o Uses of reclaimed water are regulated by State Health Department. <u>Sense of Community</u> <ul style="list-style-type: none"> o No impacts. <u>Equity</u> <ul style="list-style-type: none"> o No impacts.
Impacts same as noted for Policy 3.	<u>Financial</u> <p>Direct Public Cost of Implementation</p> <ul style="list-style-type: none"> o (1978) \$2,000,000 o Matching funds requirement may cost the WMCC from \$500,000 to \$1 million. <p>Other institutional impacts are the same as noted for Policy 3.</p>	<u>Production of Goods and Services</u> <p>Employment - Some study funds will be passed to local water supply agencies or private consulting firms benefitting employment in those areas and for the WMCC staff.</p> <p>Other economic impacts are the same as noted for Policy 3.</p>	Impacts same as noted for Policy 3.
Impacts same as noted for Policy 3.	<u>Financial</u> <p>Direct Public Cost of Implementation</p> <ul style="list-style-type: none"> o (1977-2000) \$133,140,000 (estimate of construction costs expended by the year 2000) o (2000) \$5,330,000/year (estimated operating and maintenance cost in the year 2000 when all projects are built) <p>Other institutional impacts are the same as noted for Policy 3.</p>	<u>Production of Goods and Services</u> <ul style="list-style-type: none"> o Employment - approximately 2000 temporary and 200 permanent jobs would result from construction and operation of reclamation projects. <u>Income and Investment</u> <ul style="list-style-type: none"> o Increased wages of individuals benefitting from job opportunities. o May require capital investments by industry to undertake reclamation. 	Impacts same as noted for Policy 3.
Impacts same as noted for Policy 3.	No impact.	No impact.	No impact

Section- G

BENEFITS AND COSTS OF THE PLAN

The principal benefit of this plan is that its implementation will lead toward optimal use of the water supplies available to the Bay Area. Optimal use, in this case, might be defined as the type of use that results in the least total cost to the region. Total cost includes monetary, environmental and social costs.

If we use the water we already have efficiently, we would minimize the need to develop new sources. If we build new systems we don't really need we will have to live with unnecessary monetary and environmental costs. On the other hand if we build insufficient new systems we could be severely hurt during dry spells.

The key issue is an environmental one. The cost of water is only a small part of an individual homeowner's or a business's budget. Provision of excess water supply capacity at a slightly higher cost to avoid even slight discomfort during a drought might be regarded as good insurance. The tradeoff is between retaining a river in its natural state and the degree of assurance of adequate water supply we might have in a drought.

The direct environmental effects of the water savings programs recommended in the plan are almost negligible. Residential water savings will result in an increase in the strength of residential wastewater which may reduce it's reuse potential.

Construction of the wastewater reclamation projects recommended will have certain short-term adverse environmental effects such as increased dust and noise in the vicinity of construction activities.

Section-H

WATER SUPPLY-DEMAND FOR REGIONAL POPULATION PROJECTIONS

Figure 4.

The new drought scenario

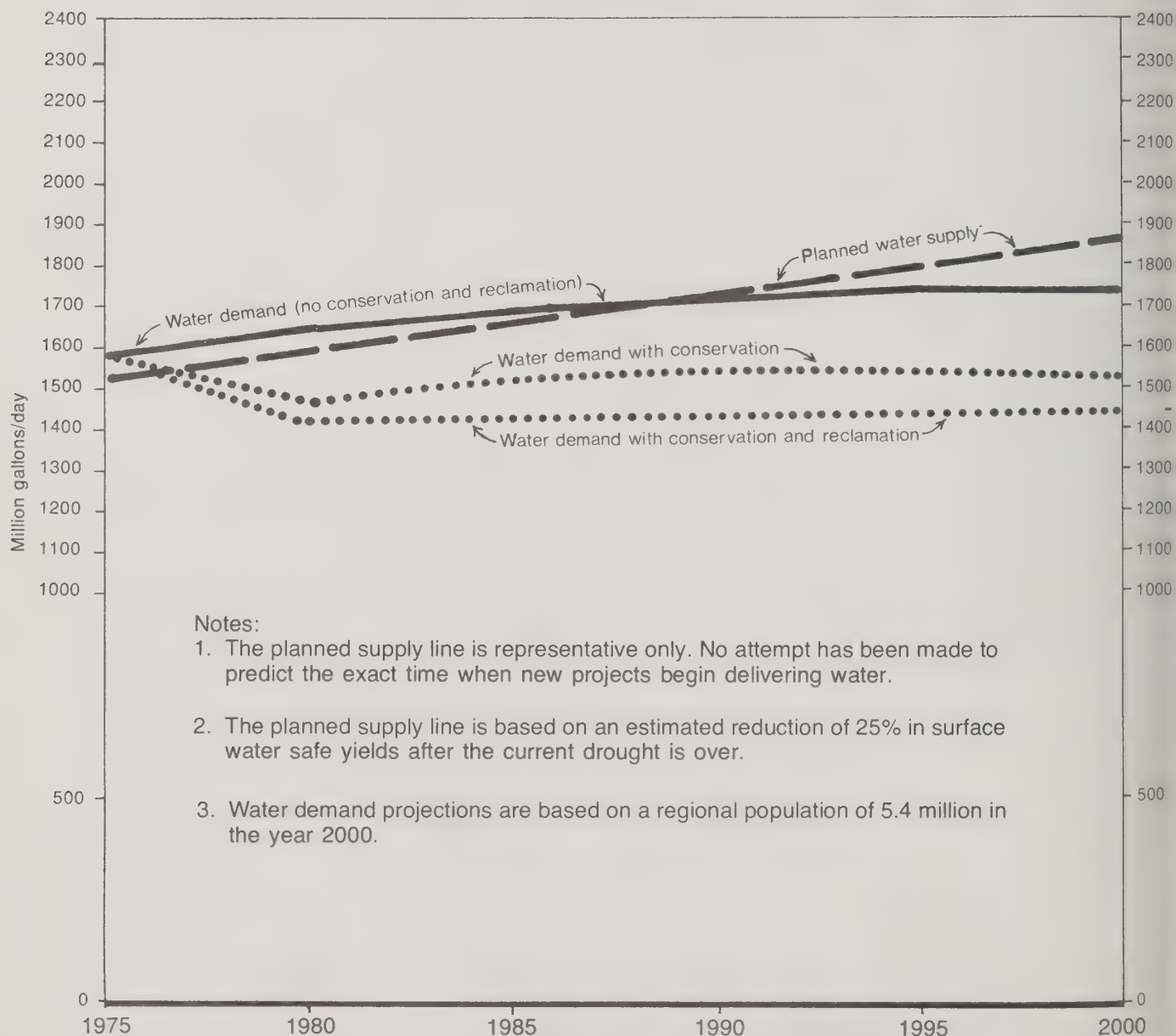


Figure 5.
The old drought scenario

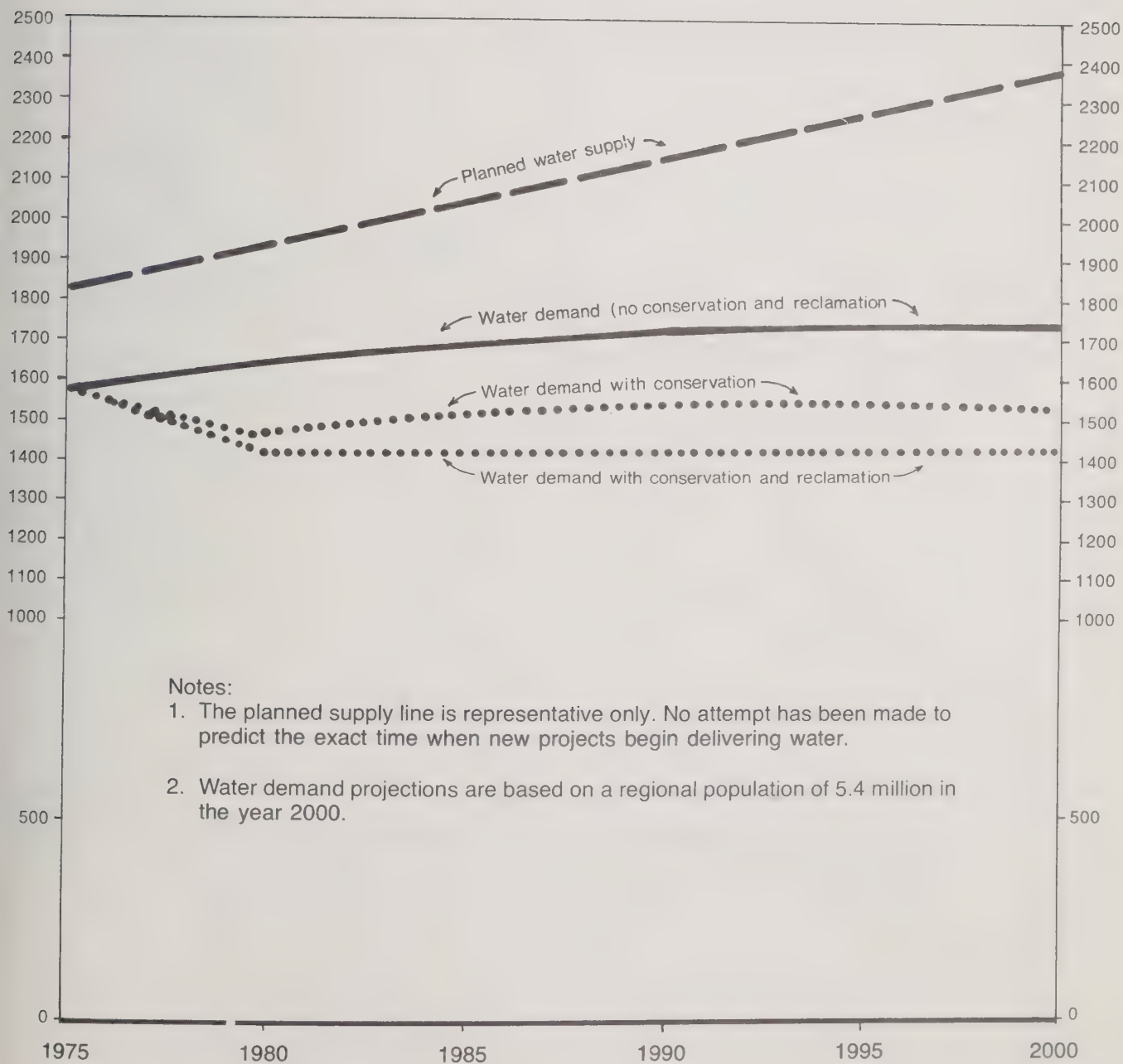


Figure 6.

The new drought scenario

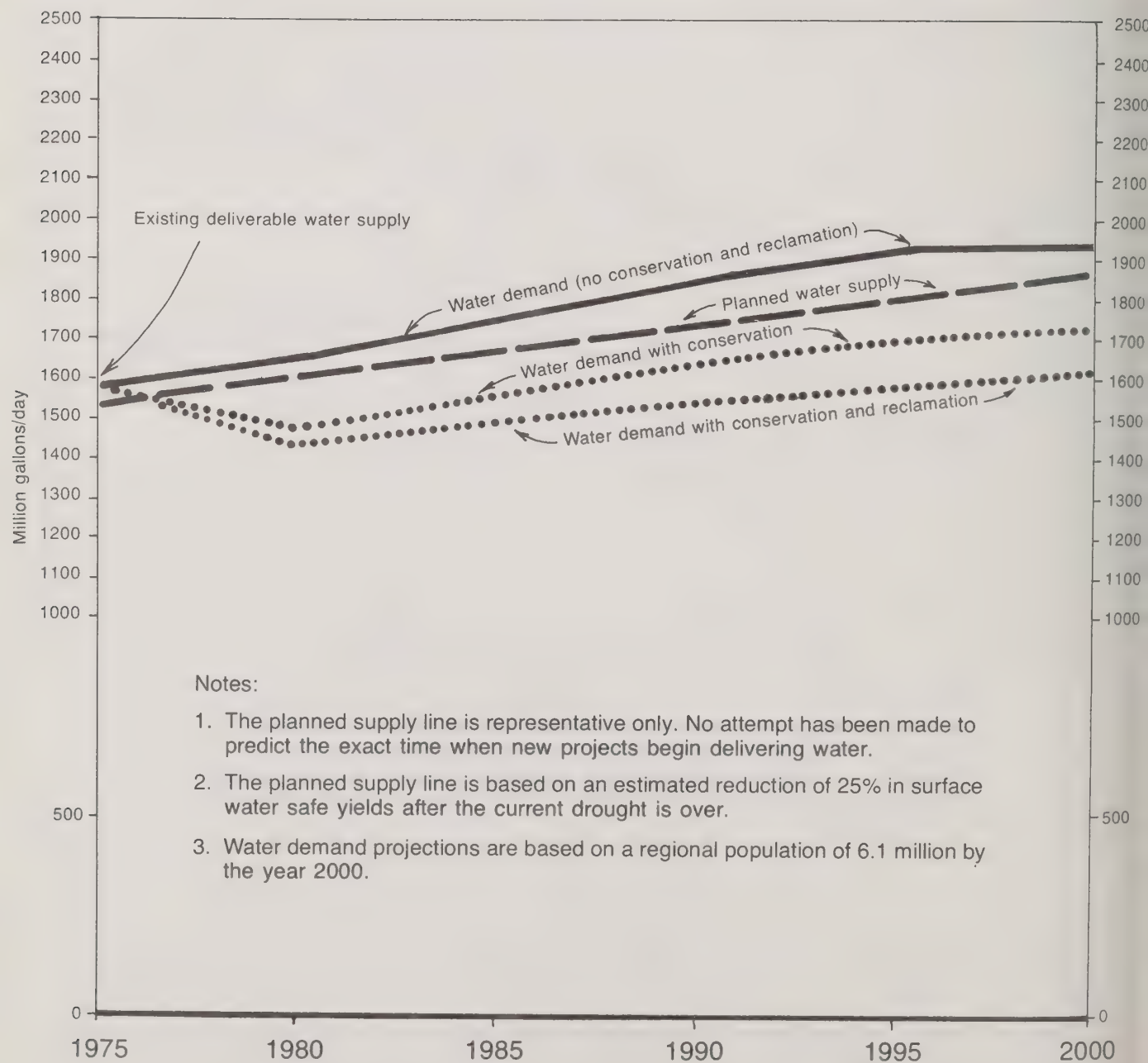
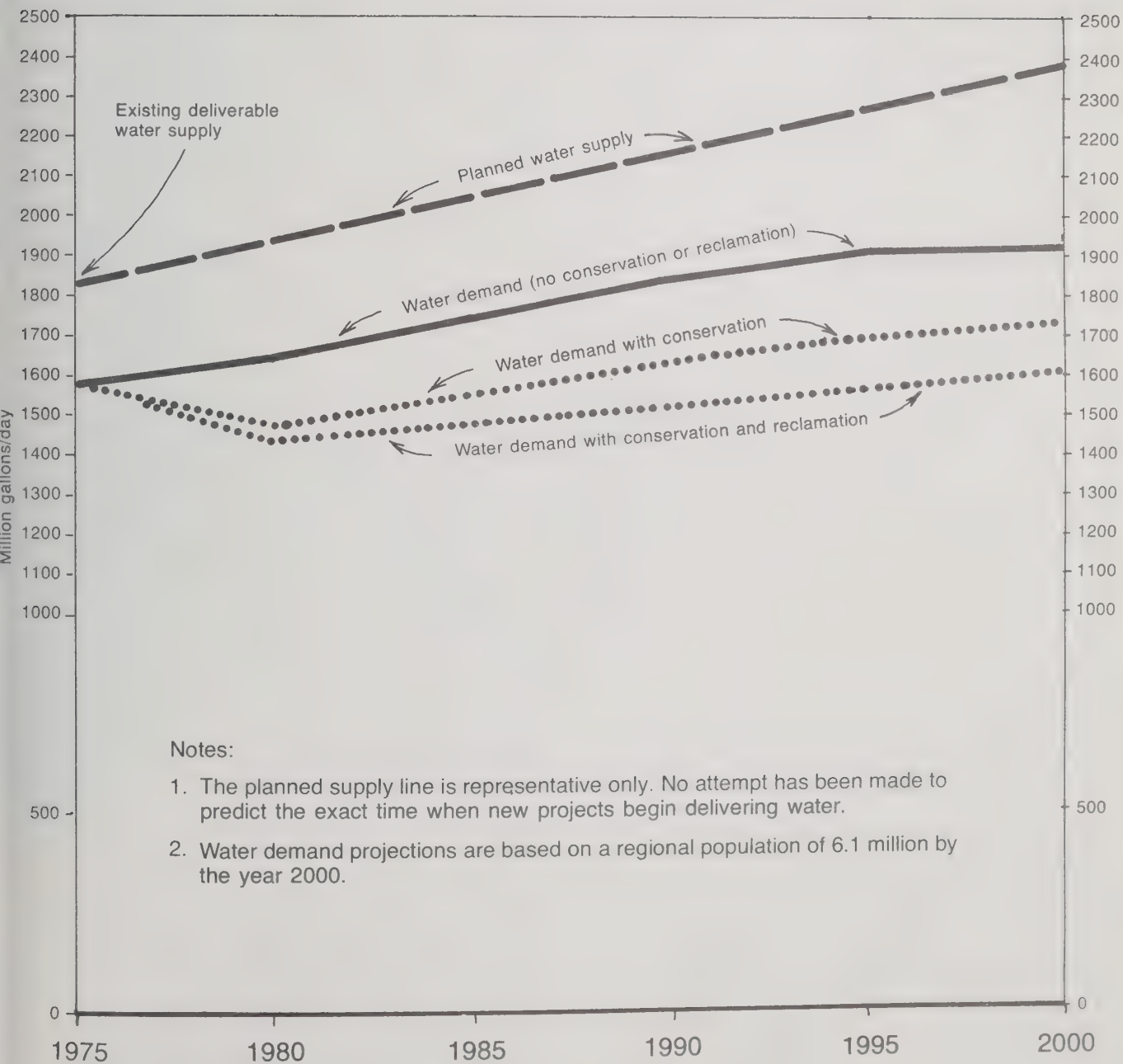


Figure 7.

The old drought scenario



Section-I

BIBLIOGRAPHY OF TECHNICAL MATERIALS

1. Water Conservation, Reuse, and Supply Report for the Bay Region,
J. B. Gilbert and Associates, November 1977.
2. Water Quality Technical Memorandum 13, Preliminary Reclaimed Wastewater
Market Survey, April 1977.
3. Water Quality Technical Memorandum 14, Preliminary Water-Use Projections
for Bay Area, April 1977.

Chapter V
**SOLID WASTE
MANAGEMENT**

Section-A

SUMMARY DESCRIPTION OF PLAN RECOMMENDATIONS

This chapter describes a regional solid waste management plan for the nine-county Bay Area. The plan is intended to meet the following Federal and State requirements:

- The Federal Water Pollution Control Act Amendments of 1972, section 208.
- The Federal Resource Conservation and Recovery Act of 1976.
- California State Senate Bill 424 (1977).

The plan addresses the regional issues identified in the county solid waste management plans. The issues are:

- Evaluation of large-scale resource recovery systems.
- Development of dependable markets for recovered materials.
- Assurance of hazardous wastes disposal capacity.
- Wastewater solids management planning.

The plan also identifies the necessary controls for the disposal of wastes on land to protect ground and surface water quality.

All the recommended policies and actions in the plan are consistent with the State policy to protect the public health, enhance the environment and conserve its natural resources. They are built upon work in progress or completed by other agencies.

The plan recommends:

- That the nine Bay Area county solid waste management plans and programs be carried out as the basis of the regional solid waste management plan.
- Coordination of the regional solid waste management plan with State planning and areawide environmental management planning. In the future, the regional plan should incorporate changes in county plans and ongoing planning activities of other State, regional, and local agencies, and include more detailed planning for regional issues.
- Reduction of the amount of municipal wastes going to Bay Area landfills by 30% by 1984, with emphasis on job-intensive, inexpensive, source separation/recycling measures.
- Development of additional information needed for resource recovery planning.
- Acceleration of the adoption and updating of the Waste Discharge Requirements for water quality protection and issuance of operating permits for all landfill disposal sites.

- Improvement of the existing permit process to facilitate the implementation of large scale energy recovery projects.
- Development of education programs to help the public understand solid waste problems and become involved in their solutions, such as reducing the use of products that cannot be recycled.
- Initiation of legislative and administrative changes, where appropriate, to improve the competitive position of secondary materials and products containing secondary materials.
- Development of dependable markets for recovered materials.
- Support of research and demonstration of existing and new community source separation recycling projects.
- Enforcement of requirements for existing hazardous waste handling, transportation and disposal practices.
- Conduct of surveys of hazardous industrial wastes and hospital wastes on a county-by-county basis.
- Encouragement of reduction, source separation, and recovery of hazardous wastes and determination of the need for additional disposal site capacity.
- Construction of facilities for processing, handling, use, and disposal of wastewater solids (sewage sludge).

In terms of continuing planning, the plan affirms the authority of county agencies to plan for local solid waste management issues at the county level and to implement new programs for material and energy recovery. The plan also recommends that ABAG should lead the planning effort for regional issues that are identified in the county plans and by the State Solid Waste Management Board.

Costs that result directly from plan implementation are estimated to be \$859,000 annually. These are primarily administrative and regulatory costs of the State, regional and local public agencies, and most will come from existing State and local programs.

The plan will not result in significant changes in the next few years, but the programs set up by the plan could eventually have significant effects on all of us. They could, for example:

- Lead to construction of a network of new facilities for material and energy recovery.
- Change household practices, such as separating waste into reusable and non-reusable parts, and using things more than once before throwing them away.
- Change buying habits, such as purchasing more durable items and products that are not hard to dispose of.

- Change the amount of packaging on some of the things we buy, and
- Change some of the materials products are made of.

A more detailed description of the plan recommendations is in Section G of this chapter.

Section-B

LAWS, REGULATIONS AND EARLIER PLANS

1. Goals and Objectives

In addition to the overall goal of the Environmental Management Program, the recommended policies and actions in this plan would meet the following objectives:

- To ensure adequate solid waste management and planning for the region
- To support management of municipal wastes, hazardous wastes, and wastewater solids at all levels of government that ensures public health and safety, protects environmental quality, and conserves resources
- To ensure that the disposal of solid waste on land is adequately controlled to protect surface and ground water quality, and the natural environment as well as public health and safety
- To ensure that applications for large-scale energy recovery facilities are efficiently and fairly processed
- To promote reduction of quantities of municipal wastes at the source of generation
- To improve markets for secondary materials
- To promote establishment of low-cost, low-technology systems and to coordinate these with appropriate back-end resource recovery programs.
- To ensure the development of additional information needed for large-scale resource recovery planning.

2. Legal Mandates

The plan is intended to meet the following Federal and State requirements.

- The Federal Water Pollution Control Act Amendments of 1972
(Section 208, Public Law 92-500)

This act requires the 208 plan to:

- identify the necessary controls to be established over the disposal of pollutants on land or in subsurface excavations to protect ground and surface water quality, and
- describe the proposed action necessary to achieve such controls.

Since all the recommended actions are aimed at reducing disposal of wastes on land (e.g., source reduction, recycling, and recovery), the entire plan would meet the above requirements.

- California Senate Bill 424 (1977)
(Section 66780.5 of the California Government Code)

SB 424 (1977) requires that:

- A regional solid waste management plan shall be prepared and updated by ABAG. The regional plan shall be based primarily on county solid waste management plans.
- The regional plan shall address only those regional issues identified in the county plans.
- The regional plan shall be consistent with the Air Quality Maintenance Plan (AQMP) and the areawide waste treatment management plan (208 plan).
- Policies and programs for regional solid waste management shall be consistent with the State policy to protect the public health, enhance the environment and conserve its natural resources.

Table 7 (page 65) illustrates how the recommended policies and actions in this plan meet the requirements of SB 424.

- The Resource Conservation and Recovery Act of 1976 (RCRA)
(Public Law 94-580)

Pursuant to section 4006 of the Act, the State Solid Waste Management Board has designated ABAG to be responsible for regional issues for solid waste management planning within the nine Bay Area counties. Regional issues will be determined by the State Solid Waste Management Board with the advice of the affected counties and regional agencies. Since this plan addresses the identified regional issues as required by SB 424 (1977), it is anticipated that the plan would also meet RCRA requirements.

The plan is consistent with the following State laws:

- The California Solid Waste Management and Resource Recovery Act of 1972 (SB 5)

This act creates the State Solid Waste Management Board (SSWMB) and requires each county to prepare and implement a comprehensive, coordinated solid waste management plan for all wastes generated and disposed of within the county.

Each plan must be approved by a majority of the cities in that county which represent a majority of the population in the incorporated areas. The plans must then be approved by the SSWMB. Thereafter, solid waste management activities at the local level must be consistent with the approved plans.

- The Planning Guidelines for the Preparation of County Solid Waste Management Plans. (Section 17176, Division 7, Title 14, California Administrative Code)

The guidelines state that it is the declared intent of the State Solid Waste Management Board to reduce total dependency on conventional disposal methods such as landfills and to maximize solid waste resource recovery.

TABLE 1. SUMMARY DESCRIPTION OF COUNTY PLANS

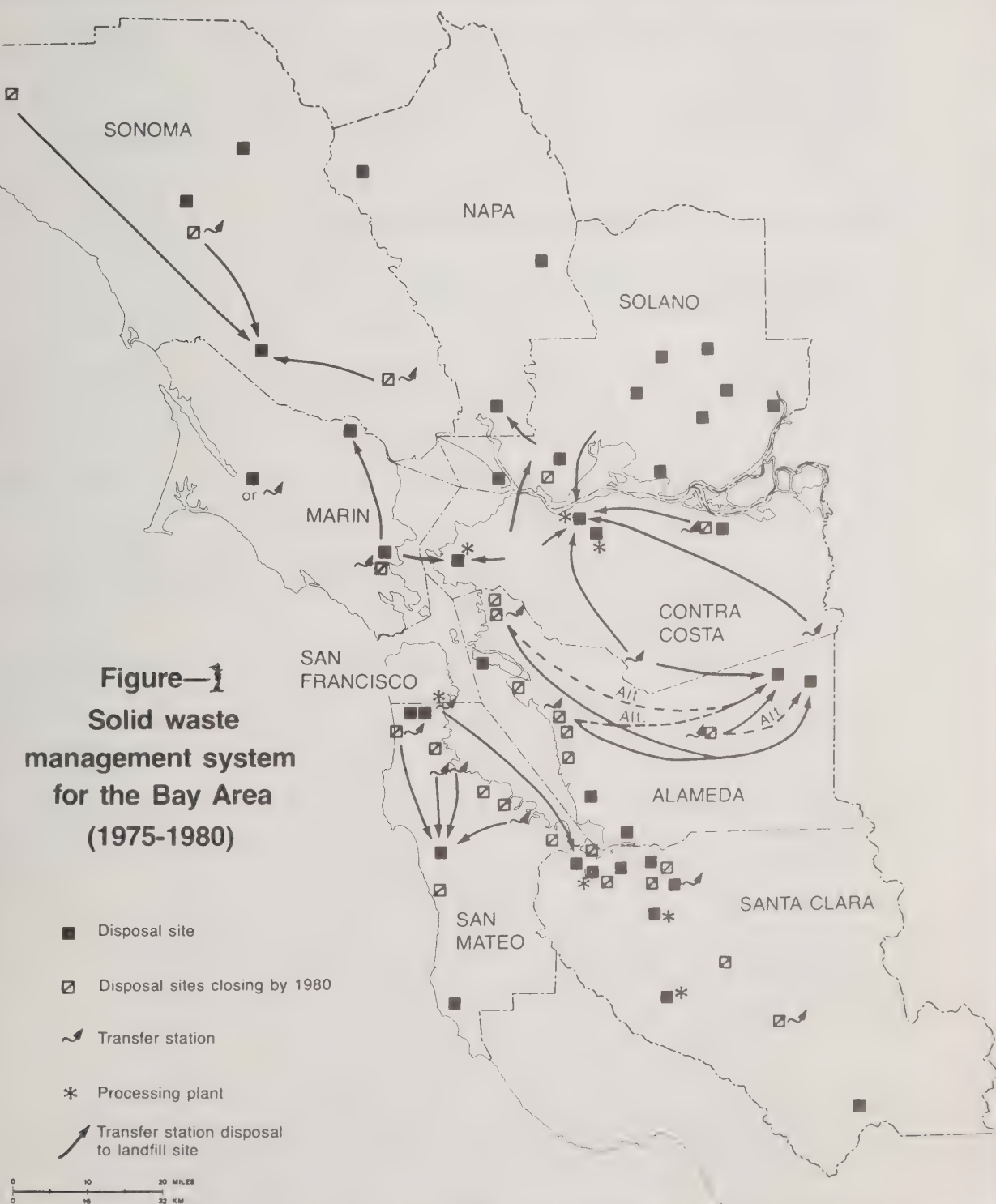
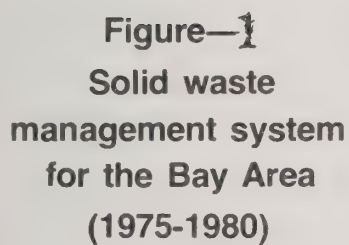
COUNTY	PHYSICAL SYSTEMS			ADMINISTRATION	OPERATION	FINANCING
	Storage and Collection	Transfer and Processing Facilities	Disposal Sites			
Alameda	<ul style="list-style-type: none"> Collection system will continue to operate as it currently does with cities and the county contracting to franchisers as necessary. Ordinances specify standards for management of solid waste; many need revision to address specific problems. 	<ul style="list-style-type: none"> Currently, there are no transfer stations, but several will be constructed. No extensive resource recovery operations will be implemented in the short term. Resource recovery operations may be starting in the short term at the Davis St. transfer station. Volunteer recycling efforts will continue. Berkeley has initiated a comprehensive program of source separation and recycling including composting of garden waste. 	<ul style="list-style-type: none"> In the short term as many as 5 of the 11 existing disposal sites will close, leaving six sites. The county plan recognizes the need to establish new sites. 	<ul style="list-style-type: none"> Joint Powers Agency Solid Waste Management Authority (17 members, 13 cities, 3 cities, 3 districts, and the County) will guide the administration of the plan. County Health Department and the City of Berkeley Health Department will enforce laws and ordinances. 	<ul style="list-style-type: none"> Collection is done by Oakland Scavenger Co., two small collectors, and two municipalities operating their own collection services. Ten of the eleven sites were privately operated in 1975. Six of the ten were also privately owned. Most of the Group 2 and 3 wastes are disposed within the county. 	<ul style="list-style-type: none"> The county plan suggests that further study is needed to determine sources of funds for plan implementation. The estimated costs were: Total capital cost \$86,700,000 New capital required \$67,120,000 Average cost per ton \$41.42
Contra Costa	<ul style="list-style-type: none"> Collection system will continue to operate as it currently does with cities and special districts contracting with franchisers. 	<ul style="list-style-type: none"> Currently, all wastes are hauled directly to landfills where limited processing or resource recovery may occur. Two transfer stations and one community drop box are recommended. Two processing facilities are proposed for Acme and West County landfills; an energy recovery facility is proposed for Central Contra Costa Sanitary District facilities. 	<ul style="list-style-type: none"> No new Class II landfill sites are proposed. One site is scheduled to close in the short term; one other will probably close by 2000. 	<ul style="list-style-type: none"> The County Board of Supervisors is the official management agency, however, it has established the Solid Waste Management Commission for policy decisions It is expected that most of the programs in the plan will be carried out by special districts, cities, & the county. Enforcement will be by the County Health Services' Environmental Health Services Division for health-related standards in all jurisdictions. The Division has been delegated enforcement powers by some cities for solid waste management standards. 	<ul style="list-style-type: none"> Group 2 wastes are collected by 15 franchised waste collectors. Collection of Group 3 wastes is arranged on an ad hoc basis by agreement between the generator and franchise haulers. Currently, all the landfill sites are privately owned and operated. Three of the five sites receive wastes from outside the county. 	<ul style="list-style-type: none"> The county plan did not recommend a particular financing scheme. Several alternatives were recommended for consideration.
Marin	<ul style="list-style-type: none"> Collection services will continue according to existing arrangements with private franchisers. Attempts will be made to make the storage and service standards more uniform. The County, 8 cities and 8 special districts have solid waste ordinances that cover collection, storage, and disposal. All have mandatory collection. 	<ul style="list-style-type: none"> There are currently no transfer stations. The county plan proposed one new transfer station be located in San Rafael. No processing or resource recovery facilities are planned for the short term. 	<ul style="list-style-type: none"> No new sites are anticipated to be needed in the short term. The five sites receiving Marin County wastes will continue to operate in the short term. 	<ul style="list-style-type: none"> A County Solid Waste Manager will be responsible for administering the plan. However funding has not been approved for the position. A Solid Waste Management Committee will be responsible for policy making, public information, reviewing and updating the Plan, and setting standards. Environmental Services Division will be designated as the enforcement agency. 	<ul style="list-style-type: none"> 11 franchise collectors have responsibility for collecting municipal wastes. Ten cities, nine special districts and the county issue franchises. The four sites in Marin county are privately owned. Some Group 2 and 3 wastes from the county are disposed in Contra Costa County. 	<ul style="list-style-type: none"> Capital expenditures occur in the private sector and will be financed through bank loans and leases, and be repaid through user fees and other charges. Administration, policy-making, planning, public information & enforcement must be financed from public funds and franchise fees.
Napa	<ul style="list-style-type: none"> Collection system will continue to operate as it currently does through franchise agreements with private collection companies. The plan recommends adding to ordinances in order to comply with State minimum standards. 	<ul style="list-style-type: none"> Currently, there are no transfer stations. The county plan recommends that the county investigate feasibility of processing facilities. No final recommendations were made on transfer stations. Two general locations for drop box transfer stations were evaluated. 	<ul style="list-style-type: none"> Two of the three landfills have capacity for the long term. One site will be closing in the short term; the operator is investigating possible locations for a new site. 	<ul style="list-style-type: none"> Administration of the county plan will rest with the city councils and the County Board of Supervisors within the unincorporated County. County Division of Environmental Health is the designated enforcement agency. 	<ul style="list-style-type: none"> Group 2 wastes are collected by 4 franchised waste collectors within the 3 franchise zones. Special pickup of wastes can be arranged with the collector. All the landfill sites are privately owned & operated. One landfill site receives wastes from Solano county. 	<ul style="list-style-type: none"> Financing will continue as is with the involved public agencies paying for administration, planning, regulation, and enforcement through public funds and franchise fees.

TABLE 1. SUMMARY DESCRIPTION OF COUNTY PLANS (continued)

COUNTY	PHYSICAL SYSTEMS			ADMINISTRATION	OPERATION	FINANCING
	Storage and Collection	Transfer and Processing Facilities	Disposal Sites			
San Francisco	<ul style="list-style-type: none"> o The Building and Health codes will be revised to require incorporation of solid waste storage in new construction. o No changes in collection practices are proposed. 	<ul style="list-style-type: none"> o A large transfer station is located in the southeast corner of the City. Some processing occurs at the transfer station. o No new transfer stations or processing facilities are planned for the short term. o The County Plan recommends that the feasibility of a resource recovery system be investigated for implementation in the medium term. 	<ul style="list-style-type: none"> o San Francisco does not have its own landfills and will continue to dispose most of its wastes at the Mt. View site. Colma Hillside site will take demolition wastes 	<ul style="list-style-type: none"> o The Department of Public Works has primary responsibility for solid waste management. o The Department of Health will be designated as the enforcement agency. 	<ul style="list-style-type: none"> o Golden Gate Disposal Company and Sunset Scavenger Company are the two licensed refuse collectors that service San Francisco. o There are also 6 debris box operators registered with the Department of Public Works. o The existing transfer station is privately owned and operated. 	<ul style="list-style-type: none"> o Financing in the short term will continue as is. Collection, transfer, & disposal are financed by private industry through service fees & charges. Administration, operation & enforcement are paid out of City General Fund, Gas Taxes, & service fees from refuse collectors.
San Mateo	<ul style="list-style-type: none"> o Collection practices will remain the same. o The plan recommends up-dating the county's and cities' garbage regulations and ordinances. 	<ul style="list-style-type: none"> o By 1980 two new transfer stations will be added to the present system making a total of four in the county. o Recycling operations will include local volunteer projects, activities by private franchisers, and municipally sponsored projects at public rubbish collection points. o A front end materials recovery system will be in operation in San Carlos. o The feasibility of methane gas recovery will be investigated for Ox Mountain. 	<ul style="list-style-type: none"> o By 1980 five disposal sites will have closed. Replacing these will be an expanded system of transfer stations and the Ox Mountain landfill. 	<ul style="list-style-type: none"> o The County Public Works Department has primary responsibility for plan administration. o The County Board of Supervisors will be the lead agency to coordinate planning, implementation, and management. o County Public Health Department has been designated as the enforcement agency. 	<ul style="list-style-type: none"> o Six scavenger companies contract with nineteen cities, five sanitary districts, and the county. o Most Group 2 and 3 wastes go to county landfills. Some residential wastes go to Santa Clara county sites. o A special district, the South County Garbage and Refuse District, operates a landfill facility at Marsh Road. 	<ul style="list-style-type: none"> o A combination of public and private financing will be needed for capital investments. Budgeting responsibility for initial capital investments should be with the local government in whose jurisdiction the facility is located. o The franchised collection of municipal refuse will continue to be paid through user collection fees or service district charges. Municipal collection will come out of the city general fund.
Santa Clara	<ul style="list-style-type: none"> o No changes in collection practices are proposed. o The Plan recommends adoption of statewide minimum standards for solid waste handling and disposal. 	<ul style="list-style-type: none"> o There are two very small privately owned and operated transfer stations. o No new transfer stations are proposed for the short term. o Three processing facilities are suggested for the county. The facilities could be in operation by 1980. 	<ul style="list-style-type: none"> o No new sites are proposed for the short term. o In the short term two of the 15 existing sites will reach capacity. One of these sites is temporarily closed. 	<ul style="list-style-type: none"> o The Solid Waste Planning Committee has primary responsibility for county-wide planning and coordination of solid waste management. o The County Environmental Health Services and Environmental Management Agency enforce health and non-health related ordinances in unincorporated county. o The County Environmental Health Services enforces health related ordinances; in general each city enforces non-health related ordinances. 	<ul style="list-style-type: none"> o Eight collection firms operate in unincorporated county. All municipalities contract or franchise with private collection firms. o Eleven sites are privately operated; two are operated by cities and one by the Navy. o All Group 2 and 3 wastes are disposed within the County. San Mateo transfers some of their wastes to Santa Clara sites. 	<ul style="list-style-type: none"> o Financing for planning and coordination will come out of city and county General Funds. o New facilities will be either privately or publicly financed as self supporting enterprises. o Gate fees will support new processing stations.

TABLE 1. SUMMARY DESCRIPTION OF COUNTY PLANS (continued)

	PHYSICAL SYSTEMS			ADMINISTRATION	OPERATION	FINANCING
	Storage and Collection	Transfer and Processing Facilities	Disposal Sites			
Solano	<ul style="list-style-type: none"> The collection system will continue to operate as it currently does. 	<ul style="list-style-type: none"> There are no existing transfer stations. Limited salvage of metals is practiced at 3 landfills. No new facilities are planned for the short range. 	<ul style="list-style-type: none"> In the short term no new sites are needed; the existing sites will have adequate capacity. Napa County receives Group 2 and 3 wastes from the County. Also Contra Costa receives wastes from Solano. 	<ul style="list-style-type: none"> A program manager will be designated to coordinate enforcement, inspection, planning and administration. The county plan designates the county health department as the enforcement agency. 	<ul style="list-style-type: none"> City of Dixon owns and operates its collection system, the rest of the cities franchise with private companies. There are 7 companies. All of the major sites are privately owned and operated. 3 of the smaller ones are under public ownership. 	<ul style="list-style-type: none"> No capital costs are incurred. Three revenue sources are recommended for administrative costs: direct inspection charges, property taxes, and disposal surcharge on Group I wastes.
Sonoma	<ul style="list-style-type: none"> The plan recommends that solid waste collection services in unincorporated areas be standardized. The plan recommends a change in licensing to an exclusive license format for commercial haulers. 	<ul style="list-style-type: none"> There is one transfer station in operation. Two transfer stations are proposed for the short term. Plan recommends feasibility studies for reuse of agricultural wastes & source separation, and market studies for glass and corrugated paper from wineries. 	<ul style="list-style-type: none"> One of the 5 existing sites will close in the short term. No new sites are proposed. 	<ul style="list-style-type: none"> No recommendations were made for administration. Currently, nine public agencies, eight cities, and the county are involved in solid waste management. The County Department of Public Health is the designated enforcement agency. 	<ul style="list-style-type: none"> There are 11 licensed collectors in the county; 6 serve the cities & 7 of these serve the unincorporated county. All the active disposal sites are owned and operated by the county. No refuse is exported or imported into the county. 	<ul style="list-style-type: none"> Collection services provided by the private sector will continue to be funded by user fees. Funds from the county tax rolls are used when the user fees fall short. Recommends paying for operational costs through fee charges.



- SB 650 (1977) - Litter Control, Recycling, and Resource Recovery.

This act calls for the development of a comprehensive statewide litter control, recycling, and resource recovery plan under the direction of the State Solid Waste Management Board, and establishes a State Litter Control, Recycling, and Resource Recovery Fund.

- Chapter 6.5, Division 20 of the California Health and Safety Code

This hazardous waste control law gives the Department of Health the responsibility and authority to establish the standards and regulations over hazardous wastes and for conducting the program for the handling, processing, use, storage, and disposal of, and the recovery of resources from hazardous and extremely hazardous wastes.

3. Previous and Concurrent Planning and Programs

- County solid waste management plans mandated by SB 5 and prepared by each of the nine Bay Area counties in cooperation with their cities.

These plans provide for the management of all waste generated and disposed of within the county and include:

- detailed implementation program to 1980 and other programs to 2000, and
- intergovernmental arrangements for implementation, enforcement, and continuing planning.

All the county plans were adopted by the counties and cities and were approved by the State Solid Waste Management Board. They will be updated once every three years.

Regional issues identified in the county plans are being addressed in this plan. The county plans that form the basis of the regional plan are summarized in Table 1 (page 6). A graphic description of the solid waste management system through 1980 for the region, as recommended in the county plans, is shown in Figure 1 (page 9). Since State law requires that the county and regional plans be updated on a regular basis, such a graphic description illustrates the solid waste management system for the near term, and cannot anticipate changes that might be brought about by a county's revisions to its solid waste management plan, as required by law.

- The Bay Area Solid Waste Management Project, being conducted by the State Solid Waste Management Board.

Phase I, completed December 1976, was to:

- identify, assemble and evaluate the relevant data on all solid waste generation, processing and disposal activities in the Bay Area, and
- determine the relative environmental, economic and social impact of alternative systems, or combinations of systems, for managing the Bay Area's solid waste.

In Phase II, now under way, the State Solid Waste Management Board proposes to begin implementing large-scale resource recovery projects in the Bay Area, as well as source separation demonstration projects. These and other projects are described in Table 2 (page 12).

The Bay Area Solid Waste Management Project will provide much of the information needed for planning for regional issues.

- The Group 1 Wastes -- Class I sites Study, conducted by the State Solid Waste Management Board, and the State Department of Health and the State Water Resources Control Board pursuant to a concurrent resolution of the Legislature (ACR79-1975).

This study, completed in August 1976, made recommendations to the Legislature on:

- the need for disposal sites for environmentally dangerous waste and
- the role of the State in ensuring environmentally sound handling of such wastes.

Applicable findings and recommendations of this study have been incorporated into this plan.

- Hazardous waste management programs, carried out by Federal, State and local agencies.

Responsibility for insuring proper management of hazardous waste is shared by all levels of government. Under a number of Federal acts, the Environmental Protection Agency has primary responsibility for regulating management of hazardous wastes. At the State level, under both Federal and State statutes, lead responsibility for hazardous waste management rests with the State Department of Health. Regionally, the Regional Water Quality Control Board and the Bay Area Air Pollution Control District exercise controls over Class I landfills.

Responsibilities of local governments for hazardous waste management recognized by State and Federal statutes include planning, issuing permits for sites and facilities, operation (or franchising operation to private industry), encouraging reclamation of hazardous materials as an alternative to landfills, and enforcement of the standards for handling hazardous wastes set by the State Department of Health.

- The San Francisco Bay Region Wastewater Solids Study, being conducted by East Bay Municipal Utility District (EBMUD, serving as the lead agency), the City and County of San Francisco, the City of San Jose, Central Contra Costa Sanitary District (CCCSD), and other wastewater agencies in the region represented by a Subregional Agency Advisory Committee.

This study is funded under Section 201 of PL 92-500 and will produce: 1) a regional plan for wastewater solids management in conformance with EPA and SWRCB requirements, NEPA and CEQA requirements, and the Environmental Management Plan; and 2) detailed facilities plans for the four largest wastewater treatment agencies in conformance with State Water Resources Control Board requirements.

TABLE 2. Summary of Current Resource Recovery Projects in the Bay Area

COUNTY	CURRENT RESOURCE RECOVERY PROJECTS AND ACTIVITIES
Alameda	<ul style="list-style-type: none"> Community recycling programs in Berkeley, Hayward, Castro Valley, San Leandro, Union City, Livermore, Dublin, and Oakland have recovered more than 22,000 tons of reusable materials such as ferrous metals, aluminum, tin, glass, cardboard and newsprint, each year. City of Berkeley has initiated a comprehensive program of source separation and recycling including composting of garden wastes. The State SWMB has purchased a tub grinder for the compost program. City of Berkeley has proposed to the State Solid Waste Management Board (SWMB) to study the concept of coordinating the source separation program with energy generation (steam). City of Alameda has initiated a feasibility study of energy recovery with financial assistance from the State SWMB. The same project has been selected by the State SWMB pursuant to AB 1395 (1976) for an economic analysis to develop recommendations to the State Legislature on funding of the project.
Contra Costa	<ul style="list-style-type: none"> Community recycling programs in Richmond, Pittsburg, El Cerrito and Concord and recovery programs at landfills have recovered more than 8,800 tons of reusable materials each year. City of El Cerrito has initiated a separate collection and recycling demonstration project with financial assistance from the State Solid Waste Management Board (SWMB). Contra Costa County has proposed to the State SWMB to study the concept of using refuse derived fuel for steam generation at the U. S. Steel Corporation plan in Pittsburg, California and potential of exportable electrical power to P.G.&E. Central Contra Costa Sanitary District has been selected by the State SWMB pursuant to AB 1395 (1976) to perform an economic analysis to develop recommendations to the State Legislature on funding of a refuse and sewage sludge co-disposal combustion project.
Marin	<ul style="list-style-type: none"> Community recycling programs in San Rafael, Mill Valley, Corte Madera, Belvedere, Tiburon, and San Anselmo and recovery program of scavenger companies have recovered more than 6,800 tons of reusable materials each year. Marin County as the lead agency will initiate a feasibility study for a four-county project (Marin, Napa, Solano and Mendocino) for energy recovery with financial assistance from State SWMB.
Napa	<ul style="list-style-type: none"> Two disposal companies and two distributing companies have recovered about 760 tons of reusable materials each year.
San Francisco	<ul style="list-style-type: none"> The two scavenger companies have recovered about 36,000 tons of reusable materials each year while community and school recycling programs have recovered about 1,000 tons each year. The City and County of San Francisco has initiated a feasibility study of energy recovery with financial assistance from the State SWMB. The same project has been selected by the State SWMB pursuant to AB 1395 (1976) for an economic analysis to develop recommendations to the State Legislature on funding of the project.

Table 2 (Continued)

COUNTY	CURRENT RESOURCE RECOVERY PROJECTS AND ACTIVITIES
San Mateo	<ul style="list-style-type: none">● The quantity of reusable materials recovered by scavenger companies and community programs in Burlingame, San Carlos, Woodside, Foster City, Pacifica, Redwood City, San Bruno, and Cities in San Mateo and South San Francisco has not been reported.● The City of Redwood City has proposed to the State SWMB to study the concept of constructing a 3,000 tons per day pyrolysis plant with conversion of the gas to electrical energy.
Santa Clara	<ul style="list-style-type: none">● Community and school recycling programs in Cupertino, Los Gatos, Mountain View, Palo Alto, Los Altos, San Jose, Saratoga and Sunnyvale have recovered more than 6,000 tons of reusable materials each year. The North Santa Clara County Waste Management Joint Powers Authority has proposed to the State SWMB a conceptual study to investigate a number of alternatives to convert its solid wastes into a source of energy.● Cities of San Jose and Santa Clara have initiated a feasibility study of an energy recovery project.
Solano	<ul style="list-style-type: none">● Distributing companies and community recycling programs in Vallejo, Vacaville, Benicia, Fairfield, and Suisun have recovered 85,000 cases of bottles and more than 450 tons of reusable materials each year.
Sonoma	<ul style="list-style-type: none">● The scavenger companies have recovered about 30,000 tons of reusable materials each year while the community recycling centers in Healdsburg, Santa Rosa and other unincorporated areas have recovered more than 1,000 tons each year.● City of Santa Rosa has initiated a separate collection and recycling demonstration project with financial assistance from the State SWMB.

The Wastewater Solids Study estimated that the bay region will generate about 2,500 cubic yards per day of wet sludge cake by 1980 from 55 wastewater treatment agencies. The impact of the increased wastewater solids on most existing wastewater treatment agencies strains their present capabilities. Wastewater solids in the bay region are processed in the majority of municipal wastewater treatment facilities by anaerobic digestion and dewatering. A few combustion facilities are used for reduction of the sludge volume. Currently, about 40 percent of the digested and dewatered sludge is disposed of in solid waste landfill disposal sites, 15 percent is combusted, with landfill disposal of ash, and 30 percent is stored in lagoons. At several of the smaller treatment plants, air dried sludge is used as a soil conditioner by the public or by commercial enterprises.

The best available disposal and use methods identified by the Wastewater Solids Study for the region are:

- compost marketing
- direct agricultural use
- land disposal or reclamation
- landfill disposal with refuse
- combustion
- co-combustion with refuse

Currently there are no land disposal, land reclamation, or co-combustion and only small-scale agricultural use and composting projects in the region. Agricultural use and compost marketing provide for the direct use of the nutrients and organic matter contained in sludge. Land disposal provides for containment of sludge at an agency controlled site. Disposal of sludge on disturbed lands can assist in reclamation of gravel pits, quarries, and other such land. Co-combustion could provide a convenient and safe disposal method for agencies located near future refuse combustion facilities.

Projects recommended by the Wastewater Solids Study for the major agencies are:

- San Jose/Santa Clara, San Francisco, EBMUD:
Staged composting (50 percent) and landfill disposal (50 percent) on an individual basis with a regional cooperative compost marketing program.
- CCCSD:
Staged co-combustion with refuse:
Stage 1. Sludge processing and process steam
Stage 2. Power generation

These recommended projects and other recommended actions are being evaluated under the Environmental Impact Report/Environmental Impact Statement review process. Final recommendations of the Wastewater Solids Study will be integrated into the regional and local solid waste management plans.

4. How the Plan Was Prepared

Steps in plan preparation included:

- Review of results of current studies and programs of other agencies.
- Preparation of technical memoranda and briefs summarizing the findings of further staff investigations.
- Development of the plan and recommendations based on the results of the current studies and technical memoranda.

In the course of plan development, the Environmental Management Task Force has given policy guidance. Staff progress has been reviewed and commented upon by the Solid Waste Advisory Committee, which includes representatives from public agencies, private industries, special interest groups, and concerned citizens.

It should be noted that the work program and budget was not designed to produce a fully developed solid waste management plan. In general, it has less detail than the air and water quality portions of the Environmental Management Plan. Many of the solid waste issues are not fully examined, but will be considered in the continuing planning process after the approval of the initial Environmental Management Plan and as additional information becomes available. However, certain activities, such as the identification of potential hazardous waste disposal site areas, which are part of the continuing planning process, are already underway through contracts between ABAG and the State Solid Waste Management Board.

Section-C

PROBLEMS AND POSSIBLE SOLUTIONS

1. Background

"Solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities.*

The basic solid waste management problem in the Bay Area is that we are burying most of our wastes in landfills instead of conserving and recovering materials and energy from wastes. While landfilling of solid waste has been the easiest and cheapest method of waste disposal in the past, it will become more and more expensive as existing landfills close and new sites must be located at greater distances.

Tables 3 and 4 (pages 17 and 18) summarize the estimated solid waste quantities generated in the Bay Area in 1975, 1980, and 1990.

In 1975, the total quantity of solid waste generated in the Bay Area was about 11.5 million tons. Of this amount, about 4.2 million was agricultural waste (crop wastes and animal manures) that was generally returned to the soil. The remainder included 6.1 million tons of municipal wastes, 0.8 million tons of hazardous wastes and 450,000 tons of wastewater solids. Most of these wastes were disposed of in landfills and there has been a considerable amount of cross-county disposal. If the wastes had an average density of 500 pounds per cubic yard and were placed on a football field, a 15 yard layer would be created every day. At the end of the year, the field would be more than 3 miles high. The same amount of waste would also fill more than 27 skyscrapers the size of the Bank of America building in San Francisco--one every 13 days.

2. Potential Environmental Effects Caused by Solid Wastes

a) Impairment of Air and Water Quality

Pollutants from inadequately controlled solid waste disposal sites can flow through and over the wastes to contaminate ground and surface waters. Past and present sites where solid waste disposal has caused water quality problems are indicated in Figure 1. Rising dust, gases and odors at sites sometimes also cause air quality problems. Therefore, properly managed sanitary landfills are control measures for air and water pollution.

* Both the Federal Water Pollution Control Act Amendments of 1972 and the Federal Resource Conservation and Recovery Act of 1976 define residual waste and solid waste in such a way that nuclear wastes are excluded. Therefore, this plan does not have the legal mandate to address nuclear waste problems. The Nuclear Regulatory Commission (NRC) of the U.S. Government has regulatory authority over nuclear wastes.

TABLE 3. SUMMARY OF ESTIMATED SOLID WASTE QUANTITIES GENERATED
IN THE BAY AREA IN 1975, 1980 and 1990

WASTE TYPE	QUANTITIES, 1000 TONS/YEAR		
	1975	1980	1990
<u>Municipal Wastes^a</u>			
Residential	2100	2400	3000
Commercial	1500	1700	2100
Industrial (non-manufacturing)	650	740	890
Uncollected	150	170	200
Construction/Demolition	1300	1300	1400
Litter/Street Sweeping	150	180	250
Food Processing	250	420	640
	<u>6100</u>	<u>6910</u>	<u>8480</u>
Hazardous Wastes ^b	820	1050	1700
Wastewater Solids (Sewage Sludge) ^c	450	1060	1180
TOTAL	<u>11500</u>	<u>13000</u>	<u>15500</u>

^aQuantities estimated by the State Solid Waste Management Board in the Bay Area Solid Waste Management Project-Phase I Report, February 1977.

^bRough quantities estimated by the Association of Bay Area Governments based on the Technical Memorandum entitled, Current and Projected Quantities of Hazardous Industrial Wastes Produced in the San Francisco Bay Area, June, 1977. It was estimated that the annual increase of hazardous waste quantities would range from 2 to 11%. A plausible estimate would be 5%. This rate of increase is based on the following estimates:

o Increase due to change in production and consumption rates	+2%
o Increase due to Federal and State pollution control requirement	+3%
o Decrease due to legislative incentives and disincentives	0%
	<u>5%*</u>

^cQuantities estimated by the Wastewater Solids Study

$$* (1 + 0.02) (1 + 0.03) (1 + 0.00) = 1.05$$

TABLE 4

SUMMARY OF ESTIMATED SOLID WASTE
QUANTITIES GENERATED IN EACH
COUNTY IN 1975, 1980 AND 1990
(Figures in 1000 tons/year)

COUNTY	YEAR	MUNICIPAL WASTES ^a								HAZARDOUS WASTES ^d	WASTEWATER SOLIDS/SEWAGE SLUDGES ^e	AGRICULTURAL WASTES ^a	TOTAL ^d
		RESIDENTIAL	COMMERCIAL	INDUSTRIAL (NON- MANUFACTURING) ^e	UN-COLLECTED ^f	CONSTRUCTION/ DEMOLITION	LITTER/STREET SWEEPINGS	FOOD PROCESSING	SUBTOTAL				
Alameda	1975	490	377	216	f	g	g	78	1161	109	88	125	1483
	1980	530	423	238	f	g	g	g	1269	140	166	g	1703
	1990	660	497	289	f	g	g	g	1524	226	175	g	2050
Contra Costa	1975	203	146	78	39	104	2.6	i	610	413	38	222	1283
	1980	230	160	81	42	113	2.8	g	667	529	191	217	1604
	1990	286	187	95	48	127	3.6	g	785	857	242	208	2092
Marin	1975	98	98	9	f	17	5.5	h	228	1	12	601	842 ^g
	1980	117	117	10	f	19	7.0	h	270	1	13	601	885
	1990	158	158	11	f	24	9.0	h	360	2	14	601	977
Napa	1975	25	25	f	f	4	h	8	62	0	2	2	66
	1980	26	27	f	f	6	h	8	65	0	28	2	96
	1990	29	29	f	f	7	h	8	73	0	34	2	109
San Francisco	1975	270	208	f	f	650	27	g	1155	17	53	2	1227
	1980	290	227	f	f	650	32	g	1199	22	124	2	1347
	1990	323	265	f	f	650	33	g	1271	36	132	2	1441
San Mateo	1975	270	279	95	f	136	43	5	828	35	56	44	963
	1980	297	308	100	f	150	46	5	906	44	68	44	1062
	1990	360	372	110	f	182	50	5	1079	72	73	44	1268
Santa Clara	1975	562	218	232	114	312	30	158	1626	76	168	198	2068
	1980	650	251	294	125	343	g	g	1851	97	265	163	2376
	1990	856	327	366	149	405	g	g	2291	157	292	150	2890
Solano	1975	87	72	15	f	13	21	16	224	158	8	775	1165
	1980	103	81	19	f	16	25	198	442	203	74	814	1533
	1990	161	141	21	f	27	41	223	614	328	93	862	1898
Sonoma	1975	90	91	f	f	20	6.8	h	204	11	24	2231	2474
	1980	107	107	f	f	23	8	h	245	14	55	g	2545
	1990	120	119	f	f	27	9	h	275	22	55	g	2583
TOTAL ^d	1975	2100	1500	650	150	1300	150	250	6100	820	450	4200	11500
	1980	2400	1700	740	170	1300	180	420	6900	1050	983	4200	13000
	1990	3000	2100	890	200	1400	250	640	8500	1700	1109	4200	15600

^aQuantities estimated by the State Solid Waste Management Board based on County Solid Waste Management Plans, in the Bay Area Solid Waste Management Project - Phase I Report, February, 1977.

^bRough quantities estimated by ABAG. It was estimated that about half of these wastes generated would be disposed of at hazardous waste disposal sites (Class I sites). Tonnages shown are mostly in liquid form; residues requiring land burial after evaporation are a very small proportion of the liquid waste.

^cQuantities estimated by the San Francisco Bay Region Wastewater Solids Study (assuming 80% moisture content).

^dTotals have been estimated and rounded.

^eNon-manufacturing industrial wastes produced from activities not directly associated with production, such as office and shipping materials.

^fQuantities included in Residential, Commercial or Non-Manufacturing Industrial Categories.

^gQuantities not reported or estimated.

^hQuantities negligible.

ⁱTwo million gallons per day.

At the same time, other air and water quality control measures create vastly increased quantities of sludge that must be accommodated in landfills or processed for resource recovery. For example, wastewater solids (sewage sludge) quantities will increase two to five-fold when all of the Bay Area's secondary wastewater treatment facilities are in operation. Scrubbers and other devices using water to control air emissions turn air polluting particles into industrial sludges with a potential for impairment of water quality.

It can be seen from these examples that solid waste management planning is needed to help alleviate air and water quality problems.

In the future, air and water quality controls will also be necessary to mitigate the effects of converting solid waste to energy.

b) Public Health and Safety Effects; Aesthetic and Nuisance Effects; Ecological Effects

Inadequate handling and disposal of solid waste may attract flies, rodents and other vectors of disease. Pathogens and parasites may be transmitted to humans if hospital wastes and sewage sludge are not handled properly. Heavy metals and toxic chemicals may enter into the food chain if sewage sludge is not properly disposed of.

Injuries may occur as a result of fires and explosions or direct contact with hazardous industrial wastes. Uncovered wastes in evaporation ponds are a danger to migratory birds. Many of these problems have been documented in the past.

Annoyance may be caused by flies, gnats, and other flying pests associated with exposed garbage. Noise, odors, smoke, and unsightliness may accompany handling and disposal of wastes.

Estuaries may be disrupted by filling the shallow reaches, mudflats, and marshes of the bay. Established biological communities may be disrupted by the filling of canyons.

c) Resource Depleting Effects--of Land, Energy and Reusable Materials in Wastes

About 6 million tons of urban refuse and about 0.4 million tons of hazardous industrial wastes are currently being disposed of annually in landfills with minimal recovery of resources beforehand. Many of the existing landfill sites will be completely filled in less than 10 years. Removing materials for reuse before landfilling can extend the life of existing landfills, reduce the quantities of wastes that have to be trucked to distant sites, with possible corresponding reduction in costs, conserve energy, and encourage recycling of reusable materials.

If regionwide programs for separating reusable materials from urban refuse--either by households and commercial establishments or by mechanical separation after collection--had been in operation in 1975, substantial quantities of materials could have been given a second use. For example:

- 200,000 tons of ferrous metal (from tin cans)--equivalent to the steel in 125,000 medium-sized cars.*
- 12,000 tons of aluminum (mostly from beverage containers)--equivalent to the aluminum in 100 Boeing 747s.*
- 140,000 tons of newsprint--equivalent of 1,000,000 newspapers/day.*

Considerably more energy is consumed in producing food containers from iron ore, or newsprint from trees, than is required to process cans and newspapers for a second use. Regionwide resource recovery programs for household and commercial wastes would reduce demand on scarce energy resources as well as slow the depletion of virgin resources such as forests and minerals.

2. Solid waste management problems in the region

For the past several years, State and local governments and the refuse removal industry have joined together in reducing adverse effects of solid waste handling and disposal. However, a number of problems remain. Table 5 (page 23) summarizes these problems. They include those identified in the county plans as regional issues, as well as commonly shared problems that local governments and other agencies can address cooperatively. The four regional issues identified in the county plans and required by SB 424 to be addressed in this plan, are discussed in the following sections.

a) Evaluation of Large-Scale Resource Recovery

Organic wastes comprise a large percentage of municipal wastes. Significant reduction of wastes going to landfills can be achieved through systems that recover resources from organic wastes. The county plans considered the known alternatives for processing these wastes: composting and chemical, biological and thermal treatment to produce energy.

Whereas the technology for composting is proven, the traditional market for compost as a soil conditioner is limited. Energy production by pyrolysis (a thermal process) was identified by several counties as the most attractive solution. However, the technology has not been completely proven for full-scale modules. Environmental questions--the air quality effects vis-a-vis Bay Area Air Pollution Control District's regulations; water quality effects of incinerator residues and pyrolysis wastewater; and the costs of mitigating undesirable effects--remain to be answered.

In addition, the large-scale resource recovery facilities that are necessary for economic feasibility may require special or expensive facilities that would be costly for any one county to finance. Coordination of physical systems or administrative responsibilities may also be required.

*From the Bay Area Solid Waste Management Project - Phase 1 Report, February, 1977, State Solid Waste Management Board.

b) Development of Dependable Markets for Recovered Materials

Significant reduction of wastes going to landfills can also be accomplished through manual separation of reusable materials at our homes and offices, or through mechanical separation after the wastes are collected.

However, the economic success of material recovery programs has been dependent on the availability of buyers offering stable prices for recovered goods. Throughout the Bay Area the lack of stable markets has been a major problem, particularly affecting local community-scale programs and also discouraging private industry from getting involved in additional programs. There is a need to coordinate efforts of public agencies, citizen groups, private industry, and buyers of secondary goods in the region.

c) Assurance of Hazardous Waste Disposal Capacity

At present, statutes define "hazardous waste" in a variety of ways. In general, hazardous wastes include those wastes that are toxic, corrosive, flammable, irritants and sensitizers. The State Water Resources Control Board classifies certain hazardous wastes as Group 1 wastes and specifies that, if disposed of in landfills, they must go to disposal points which can accept them without endangering water quality. There must be no possibility of discharge of pollutant substances to usable waters. There are currently three operating Class 1 sites in the Bay Area that receive Group 1 wastes from Northern California. It should be noted that not all hazardous wastes, e.g., asbestos, are classified as Group 1 wastes, and that some Group 1 wastes, e.g., brines, are not hazardous.

Group 1 wastes have unique characteristics that make handling, hauling and disposal more difficult and more costly than Group 2 or 3 wastes (other municipal wastes). Also, the collection, hauling and disposal of these wastes are accomplished by different operators than the municipal refuse collectors. Apparently, illegal disposal of Group 1 wastes has been a problem because of the high costs of such services and the difficulties involved in enforcement. However, the State has adopted strong enforcement controls in recent legislation (AB 1593). Although many hazardous wastes could be recycled, there will continue to be a need for suitable disposal sites in the region.

A hindrance to suggesting solutions is lack of information about the magnitude of the problem. Records of hazardous wastes transported by licensed haulers must be kept and submitted to the State Water Resources Control Board. These records account for only those hazardous wastes that are legally transported and disposed of. The total amounts generated are currently unknown.

d) Wastewater Solids Management Planning

Wastewater solids are by-products of wastewater treatment processes. Until recently, most of the wastewater treatment agencies in the Bay Area have provided for primary wastewater treatment. The traditional disposal systems have adequately handled the volume of solids produced. However, the Federal Water Pollution Control Act Amendments of 1972 mandated nationwide secondary treatment of all municipal

wastewater by July 1, 1977. Consequently, solids removed from the wastewater will increase two to five fold. The immediate impact is an overloading of existing sludge processing and final disposal systems beyond their present capabilities. Solutions would include the construction of additional processing facilities, assurance of disposal facilities, and implementation of beneficial use projects such as commercial agricultural use and composting/marketing.

Table 5 summarizes solid waste problems in the region. Almost all of these problems contribute to the four regional issues discussed above and must be dealt with before the major problems can be solved. Actions in the regional solid waste management plan (Table 6, page 31), recommended to address these problems, are shown in parenthesis.

TABLE 5

SUMMARY OF SOLID WASTE PROBLEMS AND POSSIBLE SOLUTIONS *

TYPE OF PROBLEM	MUNICIPAL WASTE PROBLEM/SOLUTION	HAZARDOUS WASTE PROBLEM/SOLUTION	WASTEWATER SOLIDS PROBLEM/SOLUTION
Waste Production	<ul style="list-style-type: none"> o Accurate estimates of the amount of municipal waste cannot be made because of present data limitations. There are no statewide standards covering measuring of wastes and data collection, recording, and reporting. (Action 1.1) 	<ul style="list-style-type: none"> o Accurate estimates of the amount of hazardous waste cannot be made because of present data limitations. (Actions 11.1 and 11.2) 	<ul style="list-style-type: none"> o Clean water, in the Bay and its tributaries, a goal desired by everyone, results in more wastewater solids or "sludge" as municipalities and industries achieve higher levels of wastewater treatment. (Actions 15.1, 15.2 and 16.1 to 16.4)
Waste Handling	<ul style="list-style-type: none"> o Existing waste handling practices are sometimes inadequate, and better enforcement of the State minimum standards is necessary. (Action 1.1) o Applications for new solid waste management facilities and disposal sites may not always be efficiently and fairly processed; coordination of the involved regulatory and commenting agencies is needed. (Actions 5.1 and 5.2) 	<ul style="list-style-type: none"> o Wastes may be stored and transported improperly. (Actions 13.1, 13.2 and 13.3) o Coordination in handling spills of dangerous materials is often inadequate. (Actions 13.4), o Enforcement of hazardous waste management operations has been inadequate, because of lack of funding and personnel. Recently passed Federal and State legislations should correct this situation. (Actions 13.6 and 13.7) 	<ul style="list-style-type: none"> o The cost of sludge processing, transport, and disposal/use is high and can be as much as one half of the operation cost of many wastewater treatment systems. (Actions 15.1, 15.2 and 16.1 to 16.4) o Local planning for wastewater solids management generally addresses immediate needs, is not coordinated throughout the region, and may not be cost-effective or environmentally sound on a regional level. (Actions 15.1, 15.2 and 16.1 to 16.4) o RRM strategy and long-range policy regarding wastewater solids management are not well defined in existing regional and subregional wastewater and municipal solid waste planning efforts. (Actions 15.1, 15.2 and 16.1 to 16.4)
Waste Reduction and Recovery	<ul style="list-style-type: none"> o Throughout the Bay Area, the lack of stable markets has affected community-scale recycling programs and also discouraged private industry from getting involved in additional activities such as collection of source separated materials. Future economic success of materials recovery programs will depend on the availability of buyers offering stable prices for recovered goods and competitive prices for products made of recycled materials. (Actions 8.1, 8.2, 9.1 and 9.2) o Large-scale energy production from solid wastes is costly, the technology for pyrolysis has not been proven for full scale modules, and there are outstanding questions on the environmental effects. (Actions 3.1 and 3.2) o Continuing public education programs on waste reduction and resource recovery are needed. (Actions 6.1 and 6.2) o State and Federal governments have not actively promoted waste reduction and resource recovery. (Actions 7.1, 7.2, 10.1, 10.2, 10.3 and 10.4) 	<ul style="list-style-type: none"> o Existing housekeeping practices and economic considerations may lead to mixing of wastes and make them more difficult to reclaim, especially in smaller plants. (Actions 12.2) o Hazardous waste recovery equipment can be very expensive and highly specialized. Having wastes hauled to disposal sites can be more convenient and is often cheaper. (Actions 12.3 and 12.4) o Waste producers are often unaware of other waste recovery alternatives such as waste exchange. (Actions 12.1 and 12.3) o Incentives for resource recovery are lacking. (Action 12.3) 	<ul style="list-style-type: none"> o Spreading liquid sludge on the surface of agricultural lands and using dried sludge for soil conditioner or fertilizer could offer a means to recycle sludge for beneficial uses, but the amount of heavy metals and other chemicals in the sludge which could enter the food chain may hinder such options. (Actions 15.1, 15.2 and 16.1 to 16.4)
Waste Disposal	<ul style="list-style-type: none"> o Since many of the existing disposal sites will be completely filled in less than ten years, new disposal sites or disposal methods have to be developed in the near future. (Actions 1.1 and 3.2) o The location of past and present solid waste disposal sites in close proximity to the Bay-Delta ground and surface waters, in some cases, has resulted in impairment of water quality. (Actions 4.1 and 4.2) o Adoption or revision of Waste Discharge Requirements by the State Regional Water Quality Control Board, San Francisco Bay Region is still needed for some 29 of the active landfill sites. (Actions 4.1) 	<ul style="list-style-type: none"> o Some infectious and pathological hospital wastes are handled similarly with household refuse and are disposed of at Class II sites with general household refuse. (Action 13.5) o No determination of the need for additional hazardous waste disposal sites can be made until better information is available on quantities and the potential extent of resource recovery. (Actions 11.1, 11.2 and 11.3) o Agreement among local governments and private industry is needed to ensure adequate land disposal capacity for the region's hazardous wastes. (Action 14.1) 	<ul style="list-style-type: none"> o Landfill and lagoons have been the most common disposal methods for processed sludge, but these methods sometimes caused environmental and nuisance problems. (Actions 15.1, 15.2 and 16.1 to 16.4) o Continuing the practice of landfilling sludge will accelerate the filling of existing disposal sites which is already a critical problem for the disposal of municipal refuse (Actions 15.1, 15.2 and 16.1 to 16.4) o Technology for energy recovery systems for co-disposal of refuse and wastewater treatment sludges is still in developmental stage. (Actions 15.1, 15.2 and 16.1 to 16.4)

*Possible solutions are the recommended actions in this plan. The action numbers are shown in parentheses after the problem statements in the table.

Section-D

PLAN RECOMMENDATIONS

The solid waste management plan recommendations are in three parts: municipal waste management, hazardous waste management, and wastewater solids management. Table 6 (page 31) lists all the plan recommendations. It includes policies, actions, responsible agencies, implementation schedule, legal authority of the responsible agency, estimated cost, source of funding, and measures to ensure implementation. The table also includes impact assessment for each recommended action. As stated previously, this plan is intended to meet Federal and State requirements. How this plan will meet requirements and begin to solve many of the identified problems has been discussed in Sections B and C. The recommended policies and actions are summarized below:

1. Municipal Waste Management

a) Recommended Policies

- Policy 1: The regional solid waste management plan should primarily be based on the county solid waste management plans, coordinated with State planning, and integrated with areawide environmental management planning. Primary responsibility for adequate solid waste management shall rest with local governments.
- Policy 2: The amount of municipal wastes going to Bay Area landfills should be reduced by 30% by 1982, with emphasis on job-intensive, inexpensive, source separation/recycling measures.
- Policy 3: The regional solid waste management plan should focus on multi-jurisdictional projects for waste reduction and recovery of materials and energy from solid waste.
- Policy 4: All solid waste disposal sites must be situated, designed, operated, and eventually closed down in a proper manner to provide protection to the surface and ground water quality and the natural environment as well as protection of public health and safety.
- Policy 5: Where possible, the existing permit process should be improved to facilitate the implementation of large-scale energy recovery projects.
- Policy 6: Federal, State and local public education programs are essential to promote awareness of the feasibility and need for waste reduction.
- Policy 7: Federal, State and local governments should adopt legislative and administrative changes which promote waste reduction, where appropriate.
- Policy 8: Facilitate regionwide cooperation in developing stable, adequate markets for secondary materials.
- Policy 9: Federal, State and local governments should adopt legislative and administrative changes to support stable, adequate markets for secondary materials and products made from them.

Policy 10: All levels of governments should encourage development of source separation programs, where appropriate.

b) Summary of Recommended Actions

- Carry out and update county plans as the basis of the regional solid waste management plan.
- Coordinate the regional plan with State and areawide planning.
- Develop additional information needed for resource recovery planning.
- Accelerate the adoption and updating of the Waste Discharge Requirements for water quality protection and issuance of operating permits for all landfill disposal sites.
- Improve the existing permit process to facilitate the implementation of large-scale energy recovery projects.
- Develop educational programs to help the public understand solid waste problems and become involved in their solutions, such as reducing the use of products that cannot be recycled.
- Advocate legislative and administrative changes, where appropriate, to improve the competitive position of secondary materials and products containing secondary materials.
- Develop dependable markets for recovered materials.
- Support research and demonstration of existing and new community source separation recycling projects.

Hazardous Waste Management

a) Recommended Policies

Policy 11: Adequate planning for hazardous waste management requires accurate data.

Policy 12: Hazardous industrial waste reduction, source separation, and recovery should be promoted in the interest of limiting land disposal.

Policy 13: Regulations should ensure safe and proper handling of hazardous wastes.

Policy 14: Future Class 1 disposal sites and facilities should be located so that they do not have adverse effects on human health and safety, air and water quality, wildlife, critical environmental resources, and urbanized areas.

b) Summary of Recommended Actions

- Enforce regulations for existing hazardous waste handling, transportation and disposal practices.
- Conduct surveys of hazardous industrial wastes and hospital wastes on a county-by-county basis.

- Encourage reduction, source separation, and recovery of hazardous waste.
- Determine the need for additional hazardous waste disposal site capacity and develop arrangements for site reservation, if necessary.

3. Wastewater Solids Management

a) Recommended Policies

Policy 15: The regional Wastewater Solids Study recommendations, when completed, should be integrated into local and regional solid waste management plans.

Policy 16: Facilities planning, design, and construction for wastewater solids management should be accomplished by local wastewater management agencies in conformance with the county solid waste management plans, the Environmental Management Plan (208 plan) and Federal and State requirements.

b) Summary of Recommended Actions

- Integrate the Wastewater Solids Study recommendations into regional and local solid waste management plans.
- Develop and review facilities plans for wastewater solids management.
- Design and construct facilities for processing, handling, use and disposal of wastewater solids.

To simplify review of the plan's fulfillment of the requirements of SB 424 (1977), the recommended policies and actions listed above have been reorganized in Table 7 (on page 65). The requirements of SB 424 (1977) are:

- A regional solid waste management plan shall be prepared and updated by ABAG. The regional plan shall be based primarily on county solid waste management plans.
- The regional plan shall address only those regional issues identified in the county plans:
 - Evaluation of large-scale resource recovery.
 - Development of dependable markets for recovered materials.
 - Assurance of hazardous wastes disposal capacity.
 - Wastewater solids management planning.
- The regional plan shall be consistent with the Air Quality Maintenance Plan (AQMP) and the areawide waste treatment management plan (208 plan).
- Policies and programs for regional solid waste management shall be consistent with the State policy to protect the public health, enhance the environment and conserve its natural resources.

Section-E

BENEFITS AND COSTS OF PLAN RECOMMENDATIONS

The assessment of the plan recommendations is summarized in Table 6 (page 31). More detailed assessment information has also been developed in the environmental impact documents for the county solid waste management plans and the Wastewater Solids Management Plan. Major environmental benefits resulting from plan implementation include:

- Protection of air and water quality.
- Reduction of public health and safety hazards, aesthetic, nuisance and ecological effects related to solid wastes.
- Conservation of resources.

These benefits can be realized through:

- Control of dust, odor, as well as leachate and surface runoff at landfill disposal sites.
- Assurance of adequate handling, transportation, and disposal of municipal wastes, hazardous wastes, and wastewater solids.
- Assurance of compliance with health and safety standards for the construction and operation of solid waste management facilities and disposal sites.
- Assurance of appropriate locations for disposal sites.
- Assurance of consistency of large-scale solid waste energy recovery systems with air and water quality goals and standards.
- Assurance of implementation of waste reduction, source separation, and resource recovery programs.

Because implementation responsibilities for solid waste management is divided among various State agencies and the nine counties, for the region, an added benefit of this plan is improved coordination of solid waste management planning among various State and local agencies, and integration of solid waste management and air and water quality planning for the Bay Area.

Although the plan will have many benefits for the region in terms of air and water quality and conservation of resources, it is not without costs, both in dollars and in impacts on environmental, institutional and economic factors. The impacts may result directly from the recommended actions such as changes that must be made in allocation of staff time by various agencies or changes in institutional arrangements. However, the recommended actions tend to create indirect impacts for environmental and economic concerns. Indirect impacts are the secondary effects of the actions; they are often more far-reaching and harder to identify and to quantify.

Implementation of many solid waste management recommendations will require a commitment of various agencies to administer, regulate, enforce, plan, or study. These actions imply shifting existing staff or hiring new personnel and could have a significant impact. In some cases impacts

on institutions may be in the form of joint powers agreements or legislative changes that alter existing institutional arrangements or authorities. Some actions may be more difficult to implement due to their controversial or unpopular nature as perceived by special interest groups. Most actions have direct costs associated with them that will be borne by the public or private sectors. (See discussion below.) However, there may also be indirect costs occurring to the private sector and in some cases they could be significant. Constructing landfill sites and transfer stations, and complying with new regulations will require investments by private solid waste management companies. Compliance with new resource recovery programs may involve altering production practices. Costs incurred by private industry will most likely be passed on to the consumer ultimately resulting in increased prices for certain goods and services. For example, residential garbage collection fees or private dumping fees may increase.

The direct impacts on the environment from plan implementation are few. Construction and operation of new solid waste management facilities will create temporary air and noise effects and loss of resource value on or adjacent to the site. Although difficult to determine, the resource recovery actions could have indirect impacts on air and water quality and on energy consumption associated with shifts in industrial production practices and with changes in transportation patterns. There appear to be no significant impacts on social factors.

Table 6 (Recommendation Tables) contains estimates for the total public and private costs of implementing the solid waste management plan. Carrying out the recommended actions results in direct costs both to public agencies and the private sector. These costs include three basic strategies: capital costs, operation and maintenance costs, and administrative and regulatory costs.

First, assumptions were made about necessary capital improvements, on-going operation and maintenance, and staff requirements, including the appropriate time frame up to the year 2000. The costs were then adjusted to 1977 dollars by calculating the present discounted value. The present discounted value is the total amount of money which, if on hand at present, would meet all capital, operation and maintenance, and administrative expenditures through the year 2000 without escalation and assuming that the money could be invested at 6-3/8%. (For comparison purposes, the present discounted value was also calculated on the basis of 10% investment rate.) This calculation yields both a total cost and an annual cost (if the action were paid for in equal payments over the 23 year period).

It should be noted that the plan has two types of recommended actions: 1) those actions that will occur regardless of the outcome of ABAG's plan (such as compliance with a State or Federal regulation); and 2) those actions that will result directly from implementation of the plan. The total cost figure includes costs for both types of recommended actions listed above. The major portion of the total cost is related to the implementation of the county plans (\$215 million per year), is not attributable to the plan, and is already committed. The costs directly attributable to the plan are estimated to be \$859,000 annually and would only occur when ABAG's plan is implemented. These costs are primarily administrative and regulatory costs of the State, regional and local public agencies, and most will be funded by the Federal and State governments. Of the \$859,000, about \$68,000 will be financed by local governments, and about \$80,000 will be expended by ABAG mostly from Federal and State grants.

Section-F

OTHER OPTIONS NOT INCLUDED IN THE PLAN

The solid waste element does not include options in the sense of choices for control measures that make up the plan, but options in the approach to preparing the plan. These more general options might have similar plan content recommendations, but different emphases, as described below.

Municipal Wastes Management Options

The first general option would involve the re-examination of the nine county solid waste management plans and the development of a truly regional management system through optimization of regional and subregional solid waste processing, transfer, and disposal facilities with or without the constraint of county boundaries. For example, EBMUD could become a subregional (two-county) solid waste management agency.

This option was not considered practicable or publicly desirable. While regional alternatives were in fact, examined in the county plans, the requirements and deadlines of SB 5 made concentration on intracounty solid waste management systems in the short term mandatory.

The county plans cover all aspects of solid waste management within the county, including collection. Collection, with very few exceptions, is carried out by private operators under franchises with local governments. While collection is entirely a local responsibility, sometimes it is inseparable from processing and disposal since the franchise agreements, which usually run for several years, may specify the disposition of the collected wastes.

Implementation of both county and regional solid waste plans is largely vested in the county solid waste management authorities. Planning for regional and subregional processing and disposal systems requires the participation of affected local governments and the franchised operators over time in working out the necessary changes in franchise agreements.

The second general option would involve the development of a regional solid waste management plan by combining the nine county plans and implementation programs. This option was not chosen for several reasons. The county plans will be revised by the counties in the future as more information becomes available about resource recovery technology, environmental effects, costs, and the amount of wastes produced. The emphasis of a county's plan may change in the future as the county, its cities and the private sector update the county plan as required by law. In addition, there are already a number of multi-county disposal arrangements. As nearby sites close there will inevitably be more cross-county transfer and disposal. The economies of scale that can be realized from resource and energy recovery systems may spur multi-county participation. Further, individual county plans cannot fully address regional air and water quality issues related to solid waste management, and these issues must be addressed by areawide plans required under the Federal Water Pollution Control Act and Clean Air Act. Finally, SB 424 (1977)

requires that regional solid waste issues be addressed by the regional plan. These issues are identified in most county plans as regional in nature and which no county alone can address. The regional plan is not simply a larger version of a county plan. It should consist of actions that provide necessary linkages among the county plans and between solid waste and other environmental planning to improve overall planning for the region.

Hazardous Wastes Management Option

One option would be to develop a comprehensive hazardous waste management system for the region instead of accepting the present system and making recommendations to improve the present system.

However, without accurate data about the quantities and types of wastes being generated, it would be very difficult to develop a more comprehensive or long-range management system. Therefore, this option will have to be considered in the continuing planning process as additional information will become available through State and Federal funding.

Wastewater Solids Management Option

One option would be to prepare a plan for wastewater solids independent of an existing study. This option was not chosen because it would duplicate efforts of the Wastewater Solids Study and would not achieve the coordination desired by both programs.

Projects for wastewater solids management are being considered by the Wastewater Solids Study. Alternatives include commercial agricultural use, composting/marketing, land disposal, and combustion of wastewater solids.

TABLE 6

**Solid Waste
Management Plan**

recommendations

Solid Waste Management Plan recommendations

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 1 THE REGIONAL SOLID WASTE MANAGEMENT PLAN SHOULD PRIMARILY BE BASED ON THE COUNTY SOLID WASTE MANAGEMENT PLANS, COORDINATED WITH STATE PLANNING, AND INTEGRATED WITH AREAWIDE ENVIRONMENTAL MANAGEMENT PLANNING; PRIMARY RESPONSIBILITY FOR ADEQUATE SOLID WASTE MANAGEMENT SHALL REST WITH LOCAL GOVERNMENTS.								
Action 1.1 Carry out and update county plans as the basis of the regional solid waste management plan.								
	Carry out county solid waste management plans as part of the regional solid waste management plan.	Counties, with participation from cities and other local jurisdictions.	Ongoing	State Senate Bill 5 (SB 5)	\$ \$ 675,000a (\$7,870,000 1978-2000) \$215,000,000c (\$570,000,000c 1978-1980)	0	State and local funds.	State Solid Waste Management Board (SSWMB) may take legal action if plans are not implemented, or shall not approve any request for State or Federal financial assistance for any solid waste management project not in conformance with the approved county plans.
Action 1.2 Coordinate the regional plan with State and areawide planning.								
	Coordinate the regional solid waste management plan with State planning and areawide environmental management planning. Incorporate changes in county plans and on-going planning activities of other State, regional, and local agencies, and include more detailed planning for regional issues. Monitor RCRA regulations and make information available to counties on impacts and opportunities.	ABAG with assistance from an inter-county and inter-agency coordinating committee.	Ongoing	SB 5; FWPCA Section 208; SSWMB Resolution 76-38; RCRA; SB 424 (1977)	\$65,000a (\$757,000a 1979-2000)	\$ 65,000a (\$757,000a 1979-2000)	Federal and State funds; ABAG dues.	Existing EPA and SSWMB requirements will ensure implementation.
a Public cost. b Private cost. c Public and private costs. Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o Indirect impact; county plans require landfills to meet standards for dust and odor control.
- o Direct impact as a result of increased emission from long-haul trucks to distant landfills recommended in some county plans.

Water Quality

- o Direct Impact; county plans require landfills to meet standards for protection of ground and surface waters.

Physical Resources

- o Direct benefits in most aspects of waste management.
- o Direct benefits in resource recovery by increasing commitment of local agencies.

Energy

- o Direct benefits in energy production since some county plans recommended energy recovery from solid waste as an alternative in the future.

Amenities

- o Noise associated with solid waste facilities construction and operation.

*Note: For more information on impacts of individual County Plans, see EIRs done for each one.

Financial

- o Direct Cost-Public: (Administrative and regulatory costs-funds committed)

Counties (9)
1978-2000

\$675,000/year
(for region)

- o Fiscal Effects on Local Government
 - Minor Impacts on the property tax rate.
 - Franchise tax revenues may be increased.
 - New facilities may result in additional fees and other user charges.
 - Financing of energy recovery facilities may depend on Federal and State grants.

Institutional

- o Location of certain facilities may not be accepted by the public.
- o Implementation of county plan may require JPA among the county and cities within the county and also agreements among private and public agencies.
- o County staff time would be required to carry out the plans.

Production of Goods and Services

- o Scavenger companies may have to improve services to meet standards or may have to expand service area.
- o Employment - Temporary and permanent increase in employment due to facilities construction, expanded collection service, compliance with State standards, and operation of new facilities.

Income and Investments

- o Private and public investment would be needed for new facilities associated with resource recovery, transfer stations, and landfills.

- o Possible temporary decrease in profits of scavenger companies due to capital investments.

Consumer Expenditures

- o Costs for implementing county plans would be passed on to the public that receives garbage collection service or that dumps at landfills.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o Compliance with standards would reduce health and safety hazards associated with solid waste.

Sense of Community

- o No Impact.

Equity

- o No Impact.

Urban Patterns

- o No Impact.

Air Quality

- o Indirect impact since the updated regional plan will consider air quality impact of large-scale energy recovery systems.

Water Quality

- o Direct Impact since the updated plan will include control measures for landfills to protect ground and surface water quality.

Physical Resources

- o Direct benefits in solid waste management.
- o Direct benefits in resource conservation since the updated plan would include action programs for waste reduction, source separation, and resource recovery.

Energy

- o Indirect benefits due to resource conservation and reduction of energy demand.

Amenities

- o Indirect impact due to noise associated with solid waste facilities construction and operation recommended in the plan.

Financial

- o Direct Cost-Public:

ABAG
1979-2000
\$65,000/yr.
(\$757,000)

- o Fiscal Effects on Local Government
 - New facilities may result in additional fees and other user charges.
 - Financing of recommended programs and facilities may depend on Federal and State grants.

Institutional

- o Location of certain recommended facilities may not be accepted by the public.
- o Implementation of regional plan may require JPA among cities and counties and agreements among private and public agencies.

Production of Goods and Services

- o Employment - Temporary and permanent increase in employment due to recommended programs and facilities construction.

Income and Investment

- o Same as Action 1.1

Consumer Expenditures

- o Costs for implementing the plan would be passed on to the public that receives garbage collection service or that dumps at landfills.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o Compliance would reduce health and safety hazards associated with solid waste.

Sense of Community

- o No Impact.

Equity

- o No Impact.

Urban Patterns

- o No Impact.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 2

THE AMOUNT OF MUNICIPAL WASTES GOING TO BAY AREA LANDFILLS SHOULD BE REDUCED BY 30% BY 1982, WITH EMPHASIS ON JOB-INTENSIVE, INEXPENSIVE, SOURCE SEPARATION/RECYCLING MEASURES.

Policy 3

THE REGIONAL SOLID WASTE MANAGEMENT PLAN SHOULD FOCUS ON MULTI-JURISDICTIONAL PROJECTS FOR WASTE REDUCTION AND RECOVERY OF MATERIALS AND ENERGY FROM SOLID WASTE.

Action 3.1

Review proposed resource recovery projects.

Review proposed resource recovery projects including large-scale waste combustion projects to ensure consistency with county and regional solid waste management and other environmental goals and standards.

EPA, SSWMB, ABAG, State Clearing-house.

Ongoing Office of Management and Budget-Circular A-95; FWPCA Section 208; SB 424 (1977)

6,000^a 0
(\$65,000^a
1978-2000)

Federal and State funds; ABAG dues.

Agencies will carry out existing review authorities.

^a Public cost.

^b Private cost.

^c Public and private costs.

Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

The impacts of this policy are covered under the impact assessment of the following Actions: 6.1, 6.2, 7.1, 7.2, 8.1, 8.2, 9.1, 9.2, 10.1, 10.2, 10.3 and 10.4.

Air Quality

- o Indirect benefits since the review would ensure consistency of proposed projects with air quality goals and standards.

Water Quality

- o Indirect benefits since the review would ensure consistency of proposed projects with water quality goals and standards.

Physical Resources

- o Direct impact on solid waste management.

Energy

- o Indirect benefits since the proposed projects would recover energy from solid waste.

Amenities

- o Direct benefits since the review would ensure mitigation measures for impacts related to amenities.

Financial

- o Direct Cost-Public:
(Administrative costs-funds committed)
ABAG - \$650/year
1978-2000 (For Region)

Other Reviewing Agencies (7)-
1978-2000 \$5,000/year
(For Region)

Institutional

- o No Impact.

Production of Goods and Services

- o No Impact.

Income and Investments

- o No Impact.

Consumer Expenditures

- o No Impact.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o Indirect benefits since the review would ensure compliance of proposed projects with health and safety standards.

Sense of Community

- o No Impact.

Equity

- o No Impact.

Urban Patterns

- o No Impact.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	IMPLEMENTING AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 3.2 Develop additional information needed for resource recovery planning.	Develop additional information that would lead to construction of a network of new resource recovery facilities through studies and demonstration projects, such as: <ul style="list-style-type: none"> o Air quality, water quality, and other environmental effects of large scale energy recovery systems. o The impasse between over-all long-term environmental benefits of waste-to-energy systems and air quality regulations. o Technical feasibility as well as financial and social impacts of resource recovery projects. o Size and location of potential markets for the 	EPA, SSWMB in conjunction with cities, counties and ABAG. resources that are to be recovered. o Cost and energy requirements for source separated and mechanically separated materials. o Feasibility of cooperative arrangements among community recycling programs for transportation, warehousing, and marketing.	1982	AB 1395 (1976); RCRA; SB 424 (1977); SB 650 (1977)	\$ 996,000 ^a (\$11,300,000 ^a 1978-1982)	0	Federal and State funds: SB 650 (1977).	EPA will implement RCRA; SSWMB will implement RCRA, AB 1395, and SB 650
Policy 4 ALL SOLID WASTE DISPOSAL SITES MUST BE SITUATED, DESIGNED, OPERATED, AND EVENTUALLY CLOSED DOWN IN A PROPER MANNER TO PROVIDE PROTECTION TO THE SURFACE AND GROUND WATER QUALITY AND THE NATURAL ENVIRONMENT AS WELL AS PROTECTION OF PUBLIC HEALTH AND SAFETY.								
Action 4.1 Accelerate the adoption and updating of the Waste Discharge Requirements.	Accelerate the adoption and updating of the Waste Discharge Requirements for <u>all</u> landfill sites.	California Regional Water Quality Control Board (RWQCB), with cooperation from the SSWMB.	Dec. 1978	California Water Code Sections 13300 and 14040; California Administrative Code, Title 23, Chapter 3, Subchapter 15.	184,000 ^c (\$2,150,000 ^c 1978-2000)	0	State general funds.	As a part of an agreement to be negotiated between ABAG and RWQCB. Sections 1008 and 4004 (a) of RCRA.
^a Public cost. ^b Private cost. ^c Public and private costs. Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air and Water Quality

- o Indirect benefits since resource recovery facilities would be designed to meet air and water quality standards based on the newly developed information.

Financial

- o Direct Cost-Public:
(Administrative costs - funds committed)

EPA and SSWMB

1978-1982 \$966,000/year
(For Region)

Production of Goods and Services

- o Same as Action 1.2

No Impact

Income and Investment

- o Private Investment may be needed for the development of new information.

Physical Resources

- o Direct benefits in solid waste management especially in resource recovery planning.

Institutional

- o Development of information may require JPA among cities and counties and agreements among private and public agencies

Consumer Expenditures

- o No impact.

Energy

- o Same as Action 1.2.

Amenities

- o No direct impact.

Air Quality

- o Indirect impacts since compliance with the requirements may result in reduction of dust and odor at landfills.

Financial

- o Direct Cost-Public:
(Administrative and regulatory costs-funds committed)
RWQCB -

1978-2000 \$15,000
(Adopt requirements)

1979-2000 \$15,000/year
(Update requirements)

Direct Cost-Private

- o Indirect impact on landfill site operators related to meeting requirements:
1978-1979 \$1,300,000
(total cost to meet new and revised requirements for 2 years)

1980-2000 \$80,000/year
(meeting requirements)

Housing Supply

- o No impact.

Physical Mobility

- o No impact.

Health and Safety

- o Indirect impacts on public health by elimination of hazards from sub-standard landfills

Water Quality

- o Direct benefits since compliance with requirements would result in protection of surface and ground water quality.

Physical Resources

- o Indirect benefits for surrounding ecosystems, agricultural lands due to increased protection of surface and ground water quality.
- o Indirect impacts on landfill management practices due to compliance with requirements.
- o Indirect temporary impacts on landfill site operations resulting from on-site construction to meet requirements.

Institutional

- o Direct impact on RWQCB because it may have to speed up the adoption of requirements.

Production of Goods and Services

- o Indirect impact resulting from interruption of landfill operations; extent would depend on site.

Sense of Community

- o No impact.

Equity

- o No impact.

Urban patterns

- o No impact.

Income and Investment

- o Direct impact on landfill site owners and operators due to required improvements to sites.

Consumer Expenditures

- o Indirect impact on landfill site users due to increase in gate fees.

Energy

- o Indirect impacts on energy demands due to energy required for construction.

Amenities

- o Indirect benefits since compliance with the requirements may result in reduction of litter at or near the landfills.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 4.2 Issue and enforce permits for solid waste facilities and disposal sites.	Issue and enforce permits for the operation of solid waste and hazardous waste facilities and disposal sites that are consistent with county and regional solid waste management planning.	California Solid Waste Management Board, City and County enforcement agencies, State and local health departments.	August 1977 Ongoing	AB 2439 (1977); AB 1593 (1977).	\$ 2,100,000 ^c (\$15,630,000 ^c 1978-2000)	0	State and local general funds.	State SWMB has the legal mandate to issue permits and may take legal action to ensure enforcement.

Policy 5

WHERE POSSIBLE, THE EXISTING PERMIT PROCESS SHOULD BE IMPROVED TO FACILITATE THE IMPLEMENTATION OF LARGE-SCALE ENERGY RECOVERY PROJECTS.

Action 5.1

Incorporate methods into existing permit process for large-scale energy recovery facilities to make it more efficient and convenient.

Regulatory agencies should assist applicants for large-scale energy recovery facilities by the following means:

- o Clarify existing regulations, including time limits for review and comments, and adopt new ones where necessary. All permitting agencies with responsibility for regulating energy recovery facilities.
- o Assign a staff member knowledgeable in solid waste management to assist applicant in early identification of permit requirements. County Solid Waste Management Agencies
- o Hold meetings prior to public hearing for discussion of project-related issues; to be initiated by any of the regulatory agencies or by project applicant. County Solid Waste Management Agencies or other permitting agencies as appropriate; ABAG, as requested.

Ongoing

Enabling legislation

\$5,500^a
(\$66,300^a 1978-2000)

\$ 5,500^a
(\$66,300^a 1978-2000)

County general funds; fees and surcharges; regulatory agencies' operating funds.

One general agreement to cover all aspects of the approved permit coordination system will be signed by participating agencies. It will specify implementation and enforcement mechanisms where appropriate. ABAG advocacy through Executive Board.

^a Public cost.

^b Private cost.

^c Public and private costs.

Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.

ENVIRONMENTAL IMPACT

INSTITUTIONAL/FINANCIAL IMPACT

ECONOMIC IMPACT

SOCIAL IMPACT

Physical Resources

- o Direct impacts on land-fill management practices due to compliance with State standards.

Energy

- o No Impact.

All other environmental impacts same as Action 4.1.

Financial

- o Direct Cost - Public: (All costs administrative and regulatory-funds committed)

SSWMB -

1978 \$48,000
(issue permits)

1978-2000 \$80,000/year
(enforce permits)

Counties and Cities -

1978 \$40,000
(Issue permits)

1978-2000 \$450,000/year
(enforce permits)

- o Fiscal Effects on Local Governments - Cities and counties may impose permit fees.

Institutional

- o SSWMB may delegate the authority of permit issuance to local enforcement agencies.
- o Permit requirements may be viewed negatively by some landfill site operators.
- o Permit requirements may be viewed positively by groups concerned with effects of solid waste management practices on environment.

Direct Cost-Private

- o Impact on all operators of private landfill sites in Region:

1978 \$40,000
(obtain permits)

1978-1979 \$450,000/year
(make necessary improvements)

Production of Goods and Services

- o Employment - permanent increase in employment due to issuance and enforcement of permits.

Income and Investment

- o Private Investment may be needed to meet permit requirements.
- o May temporarily decrease profits of site operators due to capital investments.

Consumer Expenditures

- o Costs for compliance with permit requirements may be passed on to consumers.

Health and Safety

- o Compliance with permit requirements would reduce health and safety hazards associated with solid waste.

All other social impacts same as Action 4.1.

Air Quality

- o No Impact.

Water Quality

- o No Impact.

Physical Resources

- o Direct impacts on solid waste management associated with greater efficiency and less time involved in developing new and expanded facilities.

Energy

- o No Impact.

Amenities

- o No Impact.

Financial

- o Direct Cost-Public: (Administrative and regulatory costs)

Regional, State, Federal Agencies (7)

1978 - 2000 Total for Region
\$46,300

Counties

1978 - 2000 Total for Region
\$20,000

Institutional

- o Requires moderate cooperation among regulatory agencies and possible alteration of internal permit procedures.
- o Indirect impacts on solid waste management companies that would apply for permits-high acceptability.
- o Direct Impact on permit procedures of county due to limited alterations.
- o Direct impacts due to allocation of county staff for assisting applicants in permit process.
- o Acceptable to private developers of new or expanded solid waste facilities and to involved public agencies.

Direct Cost-Private

- o Probable cost savings to private developer of solid waste facilities due to more efficient processing of permits.

Production of Goods and Services

- o No Impact.

Income and Investment

- o Indirect impact on companies that must make capital investments for solid waste facilities due to increased efficiency of permit process and less time required.

Consumer expenditures

- o No Impact.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o No Impact.

Sense of Community

- o No Impact.

Equity

- o No Impact.

Urban Patterns

- o No Impact.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 5.2 Collect and make available information on existing permit procedures and on other permit coordination efforts.	ABAG will compile information including application forms from each regulatory and commenting agency and distribute to the County Solid Waste Management Agencies; ABAG will maintain contact with other agencies (OPR, Resources Agency, ABAG-OPR Industrial Siting, AB-884, local governments) developing permit streamlining procedures and advocate appropriate legislative changes.	ABAG	Ongoing	Joint Powers Agreement (JPA) of ABAG; SB 424 (1977)	\$ 3,500 ^a (\$39,800 ^a 1978-2000)	\$ 3,500 ^a (\$39,800 1978-2000)	ABAG dues.	One general agreement to cover all aspects of the approved permit coordination system will be signed by participating agencies. It will specify implementation and enforcement mechanisms where appropriate. ABAG advocacy through Executive Board.
Policy 6 FEDERAL, STATE AND LOCAL PUBLIC EDUCATION PROGRAMS ARE ESSENTIAL TO PROMOTE AWARENESS OF THE FEASIBILITY AND NEED FOR WASTE REDUCTION.								
Action 6.1 Federal and State governments should make funds available to support education programs for promoting waste reduction.	Federal and State governments should fund education programs aimed at: o primary and secondary schools, o households, o stores and offices, and o manufacturing plants.	State and Federal governments.	Continuing	Federal and State Constitutions.	\$ 2,500 ^a (\$29,000 ^a 1978-2000)	\$ 2,500 ^a (\$29,000 ^a 1978-2000)	State and Federal funds. SB650 (1977).	After plan approval, EPA, SSWMB, cities and counties will adopt recommendations and will advocate State and Federal funding of education programs.
Action 6.2 Provide public information packets and multi-media programs on waste reduction. Introduce classes on waste reduction.	Describe and illustrate ways to reduce use and increase reuse of materials. SSWMB and ABAG would apply for available State and Federal funds to prepare and distribute throughout the region informational materials--brochures, filmstrips, etc. on ways that individuals can reduce waste and reuse materials in their homes, schools, work and leisure places. Local school districts introduce school classes on waste reduction with assistance provided by SSWMB, ABAG, and local governments.	Regional and local agencies, including school districts, as delegated by SSWMB.	Continuing	RCRA	\$202,000 ^a (\$2,352,000 ^a 1978-2000)	\$ 202,000 ^a (\$2,352,000 ^a 1978-2000)	State General Fund. SB 650 (1977)	Plan adoption ensures ABAG implementation
^a Public cost. ^b Private cost. ^c Public and private costs. Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> o No impact. <u>Water Quality</u> o No impact. <u>Physical Resources</u> o No impact. <u>Energy</u> o No impact. <u>Amenities</u> o No impact.	<u>Financial</u> o Direct Cost-Public (Administrative costs-staff time to monitor) ABAG 1978 - 2000 <u>Total</u> \$39,800 (\$3,500/yr.) <u>Institutional</u> o Possible impact on overall permit procedure if integration of solid waste coordination and systems for other development activities occurs. o May result in significant institutional changes.	<u>Direct Cost-Private</u> o No impact. <u>Production of Goods and Services</u> o No impact. <u>Income and Investment</u> o No impact. <u>Consumer Expenditures</u> o No impact.	Same as Action 5.1.
<u>Air Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Water Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Physical Resources</u> o Solid Waste - Increased public awareness of problems related to solid waste. Indirect long-term impact, including reduced demands on landfill capacity, reduced demands on virgin material. <u>Amenities</u> o No impact. <u>Energy</u> o Indirect impact resulting from shift in production practices and transportation patterns.	<u>Financial</u> o Direct costs-public: (Administrative costs) ABAG- 1978-2000 <u>Total</u> r= 6-3/8% \$14,573 r= 10% \$10,964 (\$1250/year) SSWMB- 1978-2000 <u>Total</u> r= 6-3/8% \$14,573 r= 10% \$10,964 (\$1250/year) o Federal and State governments would have to pay the direct costs of funding the education programs. o Federal and State government agencies would have to bear costs of administering the funds. <u>Institutional</u> o High degree of public acceptance-school children, businesses and offices and manufacturing industries. o Should beneficially affect public acceptance of future waste reduction programs.	<u>Direct Costs-Private</u> o Indirect impact. <u>Production of Goods and Services</u> o Employment- Possible benefit due to creation of jobs in developing and conducting the education programs. o Potential significant long term benefit on types of goods produced; increased public awareness of the ill effects of the "throwaway" ethic; shift in production and marketing practices to encourage production of more durable goods, limit production of excess packaging and throwaway items, and change marketing emphasis. <u>Income and Investment</u> o Indirect impact. <u>Consumer Expenditures</u> o Indirect impact.	<u>Housing Supply</u> o No impact. <u>Physical Mobility</u> o No impact. <u>Health and Safety</u> o No impact. <u>Sense of Community</u> o No impact. <u>Equity</u> o No impact. <u>Urban Patterns</u> o No impact.
<u>Physical Resources</u> o Solid Waste - Short-term - would give students a greater understanding of how disposal and creation of wastes affect the environment. o Medium-term - Information and experiences would filter from schools to homes. 1. Could result in reduced use of highly packaged goods, throwaway items, and non-recyclables. 2. Participation in resource recovery programs. All other environmental impacts same as action 6.1	<u>Financial</u> 1978 <u>Total</u> r= 6 3/8% \$ 5452 ABAG r= 10% 5273 <u>School Districts</u> 1978-2000 <u>Total For Region</u> r= 6-3/8% \$ 2,332,000 r= 10% \$ 1,754,000 (\$200,000/year for Region) <u>Institutional</u> o Indirect impact on public acceptance of waste reduction and resource recovery programs due to increased awareness. o Environmental groups including recycling centers would view favorably; positive effect on public acceptance of future programs.	<u>Direct Costs-Private</u> o Indirect impact. <u>Production of Goods and Services</u> o Indirect impact. <u>Income and Investments</u> o Indirect impact. <u>Consumer Expenditures</u> o Long-term Indirect Impact could be reduced expenditures on throwaway items, products in non-recyclable containers. o Preferences for more durable goods and products with less packaging could result.	Same as Action 6.1.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 7 FEDERAL, STATE AND LOCAL GOVERNMENTS SHOULD ADOPT LEGISLATIVE AND ADMINISTRATIVE CHANGES WHICH PROMOTE WASTE REDUCTION, WHERE APPROPRIATE.								
Action 7.1 Change manufacturing standards and regulations, where appropriate.	Changes in standards and regulations of manufacturing may be needed to: o reduce excess packaging, o prohibit manufacture of certain products, such as disposable containers, o standardize containers, o limit number of container sizes, o increase service life of products, e.g., appliances, and o design criteria (such as modular components) to make repair more attractive than replacement. Changes in standards and regulations of manufacturing may also be needed to encourage the design, manufacture, and reuse of packaging which: o promote energy conservation o promote resource conservation o provide incentives to manufacturers for using recycled or secondary materials.	U.S. Congress and Federal Administration; State Legislature and administration.	Continuing	Federal and State constitutions.	0	0	State and Federal funds.	After plan approval, EPA, SSWMB, cities, and counties will adopt recommendations and will advocate changes.
Action 7.2 Advocate Federal and State legislation to promote waste reduction, where appropriate.	Monitor proposed legislation; prepare analyses and advocate positions; develop proposals and seek legislative sponsors.	ABAG	Continuing	JPA of ABAG.	\$900 ^a (\$10,000 1979-2000)	\$ 900 ^a (\$10,000 1979-2000)	State and Federal funds.	Plan adoption ensures ABAG implementation.
Policy 8 FACILITATE REGIONWIDE COOPERATION IN DEVELOPING STABLE, ADEQUATE MARKETS FOR SECONDARY MATERIALS.								
Action 8.1 Prepare and update listing of buyers.	Prepare listing of buyers of secondary materials which would include estimates, quantities, quality, and specifications on materials handled.	SSWMB in cooperation with ABAG.	Continuing	SB 5; SB 424; JPA of ABAG	\$ 500 ^a (\$58,000 ^a 1978-2000)	\$ 500 ^a (\$58,000 ^a 1978-2000)	State and Federal funds.	Plan adoption ensures ABAG implementation.
^a Public cost. ^b Private cost. ^c Public and private costs. Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Water Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Physical Resources</u> o Solid Wastes - Probable impact - Implementation of these changes by industry would reduce quantities of wastes produced in manufacturing practices; reduce generation of packaging materials; make recovery of certain products more feasible; and permit increased use of secondary materials, and products containing secondary materials, in manufacturing processes. <u>Energy</u> o Indirect impact resulting from shift in production practices and transportation patterns.	<u>Financial</u> o Direct Costs-Public: The Federal and State governments would bear administrative costs involved in changing standards and regulations; part of regular function. <u>Institutional</u> o Public acceptance -Changes in certain standards and regulations may be opposed by affected industries. -Environmental groups and organizations (both private and public) involved in resource recovery would view these changes with favour. o Political and organizational feasibility - -Officials with significant urban industrial constituencies may be unwilling to advocate these changes.	<u>Direct Costs - Private</u> o For compliance with new standards, industries may bear costs of: -Changes in packaging design -Changes in operational practices, and -Changes in product design. These costs may be offset to some extent by reduced waste disposal costs or may be passed on to the consumer. <u>Production of Goods and Services</u> o Possible impact on capital investments-some industries may require new equipment. Impact would be industry-specific. <u>Income and Investment</u> o Possible increase in cost of some products. <u>Consumer Expenditures</u> o Possible increase in cost of some products.	<u>Housing Supply</u> o No Impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o No Impact. <u>Sense of Community</u> o No Impact. <u>Equity</u> o No Impact. <u>Urban Patterns</u> o No Impact.
Impacts same as Action 7.1.	Same as Action 7.1.	Same as Action 7.1.	Same as Action 7.1.

<u>Air Quality</u> o No Impact. <u>Water Quality</u> o No Impact. <u>Physical Resources</u> o Solid Waste- Possible increased viability of resource recovery activities if market for secondary goods is established or expanded. <u>Energy</u> o No Impact. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: (Administrative Costs) ABAG- 1978 Total r= 6-3/8% \$58,287 r= 10% \$43,851 <u>Institutional</u> o Increased acceptability of recycling with potential buyers. o Direct impact on groups involved in recycling due to increased awareness and participation by public.	<u>Direct Cost-Private</u> o No Impact. <u>Production of Goods and Services</u> o Possible increase in flow of goods from recycling centers or other resource recovery projects to secondary materials buyers. Possible impact on production of goods containing secondary materials. <u>Income and Investments</u> o No Impact. <u>Consumer Expenditures</u> o No Impact.	Same as Action 7.1
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SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 8.2 Provide forum for coordination.	Organize meetings for representatives of recycling centers, local governments, citizen groups, secondary markets, and private enterprise. If appropriate, assist in establishing a regional information center on recycling of residential, commercial, and industrial wastes.	SSWMB in cooperation with ABAG	Ongoing.	SB 5; SB 424 (1977); JPA of ABAG.	\$1,600 ^a (\$19,000 ^a 1978-2000)	\$1,600 ^a (\$19,000 ^a 1978-2000)	State and Federal funds.	Plan adoption ensures ABAG implementation.
Policy 9 FEDERAL, STATE AND LOCAL GOVERNMENTS SHOULD ADOPT LEGISLATIVE AND ADMINISTRATIVE CHANGES TO SUPPORT STABLE, ADEQUATE MARKETS FOR SECONDARY MATERIALS AND PRODUCTS MADE FROM THEM.								
Action 9.1 Change existing Federal and State laws and regulations to support stable, adequate markets for secondary materials and products made from them.	Change existing Federal and State laws and regulations in the following areas: <ul style="list-style-type: none">o Change tax laws to eliminate favored status of virgin materials.o Introduce Federal surtaxes or disposal charges on prices of virgin materials.o Reform Interstate Commerce Commission's and California Public Utilities Commission's rate structures to eliminate rate differentials between primary and secondary materials.o Require certain percentage of secondary material to be contained in specific products, where feasible, and set maximum permissible quantities of virgin materials in specific products.	U.S. Congress and Federal administration; State Legislature and administration.	As soon as possible.	Federal and State Constitutions.	0	0	Federal and State funds.	After plan approval, EPA, SSWMB, cities, and counties will adopt recommendations and will advocate changes.
Action 9.2 Adopt preferential purchasing policies for secondary materials, where appropriate.	Policies would favour purchase of products containing secondary materials.	ABAG; regional agencies; local governments.	As soon as possible.	Local governments enabling legislation; AB 1504 (1977)	\$16,000 ^a (\$190,000 ^a 1978)	\$16,000 ^a (\$190,000 ^a 1978)	None needed.	Plan approval by implementing agencies will ensure adoption of policies.
<p>^a Public cost.</p> <p>^b Private cost.</p> <p>^c Public and private costs.</p> <p>Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.</p>								

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> o No Impact. <u>Water Quality</u> o No Impact. <u>Physical Resources</u> o Could modify solid waste management practices in the long-term; extent of this impact is not quantifiably predictable. <u>Energy</u> o No Impact. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: (Administrative Costs) ABAG- 1978-2000 Total r= 6-3/8% \$ 18,654 r= 10% \$ 14,034 (\$1600/year) <u>Institutional</u> o Would directly impact groups and industries involved in resource recovery and in disposal, transportation or collection of municipal solid wastes. Probably be viewed favorably by the various groups and industry. It is a necessary step in modifying solid waste management practices.	<u>Direct Cost-Private</u> o No Impact. <u>Production of Goods and Services</u> o No Impact. <u>Income and Investments</u> o No Impact. <u>Consumer Expenditures</u> o No Impact.	Same as Action 7.1.
<u>Air Quality, Water Quality, Energy</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Physical Resources</u> o Direct beneficial impact on solid waste. o Possible expansion of resource recovery programs. o Possible long-term reduction of demands on timber and mineral resources. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Costs-Public: Federal and State government agencies would have administrative costs involved in changing laws and regulations; part of normal operations. <u>Institutional</u> o Public Acceptance-viewed favorably by environmental groups, secondary materials industry, and most persons involved in resource recovery. o Industries, particularly the extractive industries would likely be opposed to the change in competitive position of their goods. o Implementation-due to industrial opposition, these recommended changes may be difficult to implement.	<u>Direct Cost-Private</u> o Possible costs of shifting from use of virgin to use of secondary materials. <u>Production of Goods and Services</u> o The change in costs of secondary materials could shift production practices from use of primary materials to use of secondary. <u>Income and Investments</u> o Possible investment in equipment to shift production practices. <u>Consumer Expenditures</u> o Probable impact on prices. Could reduce costs of transporting secondary materials or products containing secondary materials.	Same as Action 7.1.
<u>Air Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Water Quality</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Physical Resources</u> o Solid Waste - Direct effect on secondary materials markets; would indirectly affect recycling and resource recovery programs. <u>Energy</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Costs-Public: (Administrative Costs) Participating Agencies (89) 1978 Total For Region r= 6-3/8% \$ 189,938 r= 10% \$ 183,679 <u>Institutional</u> o Highly acceptable to recyclers and producers of secondary goods. o Could meet with opposition by producers of goods using virgin materials.	<u>Direct Costs-Private</u> o Indirect Impact. <u>Production of Goods and Services</u> o Indirect Impact. <u>Income and Investments</u> o Indirect Impact. <u>Consumer Expenditures</u> o Indirect Impact.	Same as Action 7.1.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 10								
ALL LEVELS OF GOVERNMENTS SHOULD ENCOURAGE DEVELOPMENT OF SOURCE SEPARATION PROGRAMS, WHERE APPROPRIATE.								
Action 10.1 Provide information and assistance on source separation.	Facilitate efforts of local governments, citizen groups, and collection companies by offering technical advice, contacting secondary material buyers, and by providing a forum for coordination of these efforts. Provide information regarding available sources of funding for source separation programs.	ABAG in cooperation with SSWMB.	Ongoing.	JPA of ABAG; SR 5	\$7,800 ^a (\$91,000 ^a 1978-2000)	\$7,800 ^a (\$91,000 ^a 1978-2000)	Dues, State and Federal grants. State General Funds.	Plan approval will ensure implementation.
Action 10.2 Fund projects on source separation at the local, State and Federal level.	State and Federal legislatures should provide funding through grants or low-interest loans for source separation and recycling projects, including oil recovery.	State and Federal Legislature; SSWMB as the administering agency.	Ongoing.	SB650 (1977), SB68 (1977).	\$254,000 ^a (\$3,000,000 ^a 1978-1982)	\$254,000 ^a (\$3,000,000 ^a 1978-1982)	State and Federal funds. SB650 (1977), CPCFCA.	ABAG, SSWMB, and local governments will advocate funding for demonstration projects.
Action 10.3 Establish office paper recycling program.	Data and experience of the public agency programs would be used to expand recycling into the private sector.	ABAG & other regional agencies; local governments; private sector.	May 1978 (ABAG)	JPA of ABAG; agencies' enabling legislation.	\$ 3,900 ^a (\$45,000 ^a 1978)	\$ 3,900 ^a (\$45,000 ^a 1978)	Sales of used paper.	ABAG will start a program.
Action 10.4 Adopt resolutions supporting existing community source separation and recycling programs.	These resolutions would: acknowledge on-going efforts (such as voluntary recycling centers, school use of industrial scrap materials (Bay Area Creative Recycle), etc), encourage involvement in these programs and establish policies supporting new programs.	City Councils; Boards of Supervisors; School district boards; County Solid Waste Management Authorities.	As soon as possible.	Local governments enabling legislation.	\$ 900 ^a (\$10,000 ^a 1978)	\$ 900 ^a (\$10,000 ^a 1978)	None needed. ^a Public cost. ^b Private cost. ^c Public and private costs.	ABAG will advocate.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality, Water Quality, Energy</u> o Indirect impact resulting from shift in production practices and transportation patterns. <u>Physical Resources</u> o Possible indirect benefits- Communities may develop or increase resource recovery activities if provided with information. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: (Administrative Costs) ABAG-1978-2000 r= 6-3/8% \$ 90,938 r= 10% \$ 68,418 (\$7800/year) <u>Financial</u> o Direct Costs-Public: (Administrative Costs) Funding Agencies (Federal and State Government would pay direct costs of funding the programs.) 1978-1979 Total r= 6-3/8% \$2,953,648 r= 10% \$2,811,574 (\$1,620,000 per year for Region) ABAG-1978-1983 r= 6-3/8% \$5212 r= 10% \$4738 <u>Institutional</u> o Public Acceptance - Environmental groups and companies or individuals involved in resource recovery should view this action positively.	<u>Direct Cost-Private</u> o Indirect impact. <u>Production of Goods and Services</u> o Indirect impact. <u>Income and Investments</u> o Indirect impact. <u>Consumer Expenditures</u> o Indirect impact.	<u>Housing Supply</u> o No Impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o No Impact. <u>Sense of Community</u> o Possible indirect impact on sense of community due to common purpose. <u>Equity</u> o No Impact. <u>Urban Patterns</u> o No Impact.
<u>Physical Resources</u> o Significant impacts in communities with the demonstration projects: 1) reduced waste generation, and 2) increased recycling. o Possible indirect long-term impacts on physical resources. Demands on mineral and timber resources could be reduced, All other environmental impacts are same as Action 10.1	<u>Financial</u> o Direct Costs-Public: (Administrative Costs) Funding Agencies (Federal and State Government would pay direct costs of funding the programs.) 1978-1979 Total r= 6-3/8% \$2,953,648 r= 10% \$2,811,574 (\$1,620,000 per year for Region) ABAG-1978-1983 r= 6-3/8% \$5212 r= 10% \$4738 <u>Institutional</u> o Public Acceptance - Environmental groups and companies or individuals involved in resource recovery should view this action positively.	<u>Direct Costs-Private</u> o Indirect impact. <u>Production of Goods and Services</u> o Employment- Possible Increase in jobs in communities with demonstration projects. <u>Income and Investments</u> o New programs may require communities to invest in some equipment. o Federal and State support of these programs may encourage private investment in resource recovery operation. <u>Consumer Expenditures</u> o Indirect impact.	<u>Housing Supply</u> o No Impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o No Impact. <u>Sense of Community</u> o Possible impact on sense of community associated with common purpose. <u>Equity</u> o Changes in Lifestyle- Community involvement in resource recovery requires some minor changes in daily lifestyle of its residents. <u>Urban Patterns</u> o No Impact.
<u>Physical Resources</u> o Minor impact by reduction of total amount of waste that requires disposal. o Potential long-term impact of reducing demands on timber resources. All other environmental impacts are same as Action 10.1	<u>Financial</u> o Direct Cost-Public: (Administrative Costs) Participating Agencies (80)- 1978 Total r= 6-3/8% \$ 44,935 r= 10% \$ 43,455 <u>Institutional</u> o Public acceptability - Possible indirect impact if program is perceived as a nuisance. o Increased public awareness of recycling; future programs more acceptable.	<u>Direct Cost-Private</u> o No Impact. <u>Production of Goods and Services</u> o Could alter production practices to favor greater use of secondary fibers. <u>Income and Investments</u> o No Impact. <u>Consumer Expenditures</u> o May slightly reduce demand for new paper in the long term.	<u>Housing Supply</u> o No Impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o No Impact. <u>Sense of Community</u> o No Impact. <u>Equity</u> o No Impact. <u>Urban Patterns</u> o No Impact.
<u>Physical Resources</u> o More immediate, direct benefits may accrue to current recycling efforts in form of increased participation, increased publicity, and increased acceptance. All other environmental impacts are same as Action 10.1.	<u>Financial</u> o Direct Costs-Public: (Administrative Costs) Local Governments (50) - 1978 Total r= 6-3/8% \$ 10,247 r= 10% \$ 9,909 (about \$200 per agency) <u>Institutional</u> o Public Acceptance - Positive effect on public acceptance of concept of recycling.	Same as Action 10.1.	Same as Action 10.1.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 11 ADEQUATE PLANNING FOR HAZARDOUS WASTE MANAGEMENT REQUIRES ACCURATE DATA.								
Action 11.1 Conduct surveys of hazardous industrial wastes.	Survey the amount of hazardous industrial waste currently being generated, what these materials are and how they are currently being disposed of.	State Dept. of Health with assistance from counties, SSWMB and ABAG.	1979	RCRA Sec. 3002(6); State Hazardous Waste Control Act; SB 424 (1977); SB 5.	\$ 6,400 ^a \$75,000 ^a 1978-79) \$1,400 ^b (\$16,000 ^b 1978-79)	\$ 6,400 ^a (\$75,000 ^a 1978-79) \$1,400 ^b (\$16,000 ^b 1978-79)	RCRA; SWMB; BASWMP Phase II; with local matching funds (incl. in-kind services)	Agreements to be negotiated between ABAG, State agencies and the county solid waste management agencies.
Action 11.2 Conduct surveys of hazardous hospital wastes.	Survey the amount of infectious or pathological waste currently being generated, what these materials are, and how they are currently being disposed of.	State Dept. of Health with assistance from counties, SSWMB and ABAG.	By April 1980	Proposed State Hazardous Waste Control Act Amendments; SB 424 (1977); RCRA; SB 5.	\$ 400 ^a (\$4,900 ^a 1979-80) \$100 ^b (\$900 ^b 1979-80)	\$ 400 ^a (\$4,900 ^a 1979-80) \$100 ^b (\$900 ^b 1979-80)	RCRA; SWMB; BASWMP Phase II; with local matching funds (incl. in-kind services)	Agreements to be negotiated between ABAG, State agencies and county solid waste management agencies.
^a Public cost. ^b Private cost. ^c Public and private costs.								
Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality
o No Impact.Water Quality
o No Impact.Physical Resources

- o Possible Indirect impacts due to ability to determine need for future Class I sites.

- o Indirect Impact-possible decrease in illegal dumping of hazardous wastes.

Energy
o No Impact.Amenities
o No Impact.Financial

- o Direct Cost-Public: (Administrative and regulatory costs)

State Dept. of Health-

1978-1979	Total
r= 6-3/8%	\$ 16,013
r= 10%	\$ 15,238

Counties (9)

1978-1979	Total
r= 6-3/8%	\$ 59,456
r= 10%	\$ 56,579

Institutional

- o Direct Impact on industrial generators of hazardous wastes due to perceived intrusion into industry practices.
- o Minor temporary impact on County staff due to staff commitment to conduct surveys.

Direct Cost-Private

- o Minor temporary Interruption in normal operations to supply information to County surveyors.

Hazardous Waste Generators-

1978-1979	Total
r= 6-3/8%	\$ 16,013
r= 10%	\$ 15,238

Production of Goods and Services

- o No Impacts.

Income and Investments

- o No Impact.

Consumer Expenditures
o No Impact.Housing Supply
o No Impact.Physical Mobility
o No Impact.Health and Safety

- o Possibility of indirectly leading to less contact with dangerous materials.

Sense of Community
o No Impact.Equity
o No impact.Urban Patterns
o No Impact.Physical Resources

- o Indirect minor impacts due to greater preprocessing for disposal to sewers and therefore reduce use of landfill sites.

All other environmental impacts same as Action 11.1

Financial

- o Direct Cost-Public: (Administrative Costs)

State Dept. of Health

1979-1980	Total
r= 6-3/8%	\$ 2006
r= 10%	\$ 1863

Counties-

1979-1980	Total
r= 6-3/8%	\$ 2856
r= 10%	\$ 2629

Institutional

- o Direct Impact on hospital administrators due to perceived inconvenience of supplying information.
- o Impact on legal capability since requires amendment to State Hazardous Waste Control Act (in process).
- o Direct temporary impact on allocation of staff due to staff commitment to conduct surveys.

Direct Cost-Private

- o Minor temporary Interruption in normal operations to supply information to County surveyors.

Hospital Administrators-

1979-1980	Total
r= 6-3/8%	\$ 857
r= 10%	\$ 789

All other economic impacts same as Action 11.1.

Same as Action 11.1

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 11.3 Determine whether there is a need for additional Class I site capacity.	Determine whether or not additional Class I sites are needed in the Bay Area. Determine waste quantities that can be handled at each existing Class I site.	State Health Dept. in conjunction with h RWQCB, SSWMB, ABAG and the counties.	Ongoing.	AB 1593 (1977); AB 598 (1972); SB 424 (1977); SB 5; RCRA.	\$ 1,800 ^a (\$21,000 ^a 1979)	\$ 1,800 ^a (\$21,000 ^a 1979)	SWMB Grant.	Agreements to be negotiated between ABAG, State agencies and county solid waste management agencies.

Policy 12

HAZARDOUS INDUSTRIAL WASTE REDUCTION, SOURCE SEPARATION, AND RECOVERY SHOULD BE PROMOTED IN THE INTEREST OF LIMITING LAND DISPOSAL.

Action 12.1 Encourage hazardous waste reduction.	Encourage industry to make changes in its processes to reduce the amount of hazardous waste generated.	State Dept. of Health with assistance from ABAG, SSWMB, RWQCB and county solid waste management agencies.	Ongoing.	AB 1593 (1977); SB 424 (1977); SB 5; RCRA	\$13,000 ^a (\$152,000 ^a 1978-2000)	\$13,000 ^a (\$152,000 ^a 1978-2000)	RCRA; State funds; CPCFA.	Agreement to be negotiated between ABAG, State agencies and county solid waste management agencies.
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^a Public cost.

^b Private cost.

^c Public and private costs.

Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.

ENVIRONMENTAL IMPACTS

(Impacts are contingent on the determination that a site is needed. Also impacts are site specific).

Air Quality

- o Indirect Impact; solar evaporation ponds may have some odor. Extent of the odor depends on how well the site is operated. Burial activities may lead to increased dust.

Water Quality

- o Indirect Impact if site is established to replace an existing site with water quality problems.

Physical Resources

- o There may be indirect impacts on flora and fauna, agricultural land, mineral extraction and timber lands. Effects could be minimized in the site selection process.
- o Indirect impacts due to shifts in the routes traveled by waste trucks, need for a new transfer station, and volumes of waste disposed of at existing Class I sites.

Energy

- o No Impact.

Amenities

- o Reduction of the visual amenities of the chosen site.
- o Site preparation activities, traffic associated with disposal, and on-site operations would result in increased noise levels.

INSTITUTIONAL/FINANCIAL IMPACTS

Financial

- o Direct Cost-Public:
(Administrative Costs)

ABAG-

1979	Total
r= 6-3/8%	\$ 4419
r= 10%	\$ 4132

Counties (9)

1979	Total For Region
r= 6-3/8%	\$16,567
r= 10%	\$15,493

- o If financed publicly, site may be financed by local government bonds or increases in property taxes.
- o If the site is private, it would establish an additional industry to be taxed.
- o Probable revenue to the jurisdiction from development and construction fees.

Institutional

- o Unknown indirect impact on existing Class I site operators due to competition. Possible reaction of communities depending on the locations of site(s) which could lead to poor public acceptability.
- o ABAG and Counties may have difficulties in making this decision due to its sensitive nature.
- o County staff may be shifted from other duties to work on this study.

ECONOMIC IMPACTS

Direct Cost-Private

- o No Impact.

Production of Goods and Services

- o Indirect impact on the number and location of industries that depend on Class I sites for disposal of their hazardous wastes.

- o Employment - Temporary construction employment and more permanent employment in operating the site could result.

Income and Investments

- o Property chosen for site could increase in value; surrounding property could decrease in value.
- o Indirect impact on capital investments by requiring an investment in land and equipment for Class I sites by the owner or operator of the facility(s).
- o Possible indirect impact on the profits of existing competing Class I site owners and operators since revenue would be spread to include the new site(s).

Consumer Expenditures

- o Indirect impact on disposal rates at Class I sites related to profits of site owners and operators.

SOCIAL IMPACTS

Health and Safety

- o The decision would help ensure disposal capacity of Group I (hazardous) wastes and therefore have an indirect, moderate, beneficial impact on public health.

Urban Patterns

- o Possible indirect impact on land use by restricting use of site and adjacent areas.

All other social impacts same as Action 11.1.

Air Quality

- o There would be an indirect impact on dust and odors due to reduced need for land disposal.

Water Quality

- o There may be an indirect impact on water quality due to reduced need for land disposal.

Physical Resources

- o Direct impact on solid waste by changing industrial practices, thereby reducing wastes.
- o Indirect impacts on solid waste by reducing quantity of hazardous wastes generated, by reducing volume required for storage, collection, and hauling, by prolonging life of existing Class I sites and reducing need for additional sites.
- o Possible indirect impact on raw materials due to reduced consumption.

Energy

- o Possible changes in the use of energy. Impact cannot be predicted.

Amenities

- o No Impact.

Financial

- o Direct Cost-Public:

ABAG-

1978-2000	Total
r= 6-3/8%	\$ 29,747
r= 10%	\$ 21,929

(staff time - \$2,500/year)

State Department of Health-

1978-2000	Total
r= 6-3/8%	\$ 122,416
r= 10%	\$ 92,101

(staff time - \$10,000/year)

Institutional

- o May be unpopular with generators due to perceived costs and reluctance to change; popular with environmental groups.
- o Legal capability of the State Dept. of Health to aggressively encourage waste reduction is uncertain.
- o Direct impact on State Health Dept. staff due to staff commitment to help industry.

Direct Cost-Private

- o Indirect short-term cost of modifying processes and plants; long-term reduction of disposal costs.

Production of Goods and Services

- o Short-term indirect impact as process changes are made; long-term impact as savings are realized.

Income and Investment

- o Possible minor to significant investments by industry in new equipment depending on commitment to waste reduction and type of process involved.

- o Possible short-term reduction of profits due to investments and long-term increases in profit due to reduction of disposal fees for industrial generators of hazardous wastes.

Consumer Expenditures

- o Possible indirect benefits in cost savings for consumer.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o Indirect impact on public health by reducing the amount of hazardous wastes to be managed.

Sense of Community

- o No Impact.

Equity

- o No Impact.

Urban Patterns

- o No Impact.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 12.2 Encourage hazardous waste source separation.	Encourage industry to avoid mixing wastes to facilitate recycling.	State Health Dept. with assistance from ABAG, SSMB, RWQCB and county solid waste management agencies.	Ongoing.	AB 1593 (1977); SB 424 (1977); SB 5; RCRA	\$13,000 ^a (\$152,000 ^a 1978-2000)	\$13,000 ^a (\$152,000 ^a 1978-2000)	RCRA; State funds; SB 650.	Agreement to be negotiated between ABAG, State agencies and county solid waste management agencies.
Action 12.3 Encourage hazardous waste resource recovery.	Provide incentives to industry for resource recovery, such as:	Congress, EPA State Legislature:		U.S. Constitution, State Constitution and:	\$18,000 ^a \$181,000 ^a (1978-2000)	\$18,000 ^a (\$181,000 ^a 1978-2000)		Agreements to be negotiated between ABAG, State Health Dept., the Solid Waste Management Board, and county solid waste management agencies.
	o Low interest loans for new equipment	State Health Dept.; SSMB.	Ongoing	Legal authority for implementing agencies			RCRA and CPCFA funds.	
	o A Statewide waste exchange and marketing system.	State Health Dept.	Ongoing.	State Health Dept.; RCRA and State Hazardous Waste Control Act			RCRA; State funds. CPCFA.	
	o Information dissemination through business associations	ABAG; State Health Dept.	Ongoing				State funds.	
	o Guidance to industry on reusing waste.	State Health Dept.	Ongoing	SSMB; RCRA and SB 5			RCRA; State funds.	
	o Charges to dispose of materials at Class 1 sites with exemptions for installations with recovery equipment.	State Health Dept., county solid waste management agencies.	Ongoing	ABAG: HUD designation as regional planning agency, OMB Circular A-95 designation, Section 208 of FWPCA; SB 424 (1977); RCRA			RCRA; State funds.	
					^a Public cost. ^b Private cost. ^c Public and private costs.			
					Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.			

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Physical Resources

- o Direct Impact on solid waste by changing Industrial operating practices thereby encouraging separation of wastes.
- o Indirect Impacts on solid waste may alter the way hazardous wastes are collected, increase the amount of recovered materials available, increase the life of existing Class 1 sites, reduce the need for more Class 1 sites.
- o Possible reduction in consumption of raw materials.

All other environmental impacts same as Action 12.1.

Financial

o Direct Cost-Public:

ABAG-

1978-2000	Total
r= 6-3/8%	\$ 29,147
r= 10%	\$ 21,929
(staff time - \$2,500/year)	

State Department of Health-

1978-2000	Total
r= 6-3/8%	\$ 122,416
r= 10%	\$ 92,101
(staff time - \$10,000/year)	

Institutional

o Same as Action 12.1.

Production of Goods and Services

- o Indirect impact on production since it may result in greater use of recycled materials.

- o Employment- Indirect impact on employment due to slight increase in time spent in separating materials.

Income and Investment

- o Indirect impacts on capital since may result in small investment to purchase facilities to collect and store recyclable wastes separately.

- o Possible short-term reduction of profits due to necessary investments; long-term increases from decreased costs for disposal and for raw materials.

All other economic impacts same as Action 12.1.

Same as Action 12.1.

Physical Resources

- o Direct Impact on solid waste by changing Industrial operating practices thereby encouraging resource recovery.
- o Indirect Impacts on solid waste--since may alter the amount of waste going to landfills, may require additional source separation, may increase the life of existing Class 1 sites, may reduce the need for more Class 1 sites.
- o Possible reduction in consumption of raw materials.

All other environmental impacts same as Action 12.1.

Financialo Direct Cost-Public:
(Administrative and regulatory costs)ABAG-

1978-2000	Total
r= 6-3/8%	\$ 29,147
r= 10%	\$ 21,929
(staff time - \$2,500/year)	

State Department of Health

1978-2000	Total
r= 6-3/8%	\$ 122,416
r= 10%	\$ 92,101
(staff time - \$10,000/year)	

SSWMB

1978-2000	Total
r= 6-3/8%	\$ 58,293
r= 10%	43,858
(staff time - \$5,000/year)	

Institutional

- o Unpopular with generators due to perceived costs and reluctance to change; popular with environmentalists; any tax law changes could be controversial.

- o Possibly complex to implement. Measures may require the initiative of three implementing agencies.

- o Some incentives may require enabling legislation. (Especially any tax law changes.)

- o Direct Impact on SHD, SSWMB, and ABAG staff due to commitment to help industry.

Direct Cost-Private

o Same as Action 12.1.

Same as Action 12.1.

Production of Goods and Services

- o Indirect impact on production due to less use of virgin materials.

- o Employment- Indirect impacts on employment by slightly increasing jobs at resource recovery facilities and decreasing jobs in production of virgin materials- possible net job increase.

Income and Investments

- o Indirect impacts on capital since results in purchasing resource recovery facilities by industries that generate hazardous wastes.
- o Possible short-term reduction of profits due to investments; long-term increases from decreased costs for disposal and for raw materials.

Consumer Expenditures

- o Unknown Indirect impact on cost related to indirect cost to industry.
- o Less virgin materials; more reclaimed materials (indirect).

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 12.4 Investigate the consolidation of hazardous wastes for processing.	Investigate the possibility of waste consolidation to facilitate waste processing and recovery.	State Health Dept. with assistance from ABAG, SSWMB, RWQCB, and county solid waste management agencies.	Ongoing.	RCRA; State Hazardous Waste Control Act; SB 424 (1977); SB 5.	\$ 3,000 ^a (\$30,000 ^a 1979)	\$ 3,000 ^a (\$30,000 ^a 1979)	RCRA; State funds.	Agreement to be negotiated between ABAG, State agencies, and county solid waste management agencies.
Policy 13 REGULATIONS SHOULD ENSURE SAFE AND PROPER HANDLING OF HAZARDOUS WASTES.								
Action 13.1 Enforce proper labeling requirements.	Require that containers used for storage, transport, or disposal of hazardous waste accurately identify their contents.	EPA; State Health Dept.	Ongoing.	RCRA Sec. 3002 (2); State Hazardous Waste Control Act; AB 1593 (1977).	NA	0	RCRA; State funds.	Required by existing Statute; EPA will enforce.
Action 13.2 Enforce adequate storage facilities requirements.	Require that containers used for on-site storage for transport and for disposal be made of proper materials and designed so as to minimize the hazards of leaking or breaking.	EPA; State Health Dept.	Ongoing.	RCRA Sec. 3002 (3); State Hazardous Waste Control Act; AB 1593 (1977).	NA	0	RCRA; State funds.	Required by existing Statute; EPA will enforce.
Action 13.3 Enforce requirements for adequate record-keeping practices by waste generators.	Require that recordkeeping practices accurately identify the type and the quantity of hazardous waste generated.	EPA; State Health Dept.		RCRA Sec. 3002 (1). AB 1593 (1977).	NA	0	RCRA; State funds.	Required by existing Statute; EPA will enforce.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> o No Impact. <u>Water Quality</u> o No Impact. <u>Physical Resources</u> o Indirect impacts on solid waste may include increased feasibility of re-source recovery, more pilot programs, decreased amount of hazardous wastes going to Class 1 sites (thereby increasing the life of existing sites and reducing the need for new sites). o Indirect impacts may include necessitating changes in collection and transportation systems. <u>Energy</u> o No Impact. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: (Administrative costs) ABAG- 1979 Total r= 6-3/8% \$ 2209 r= 10% \$ 2066 Department of Health 1979 Total r= 6-3/8% \$ 27,838 r= 10% \$ 26,033 <u>Institutional</u> o The legal capability of the State Health Department and ABAG to conduct an <u>in depth</u> study is uncertain. o Direct impact on allocation of State Health Department and ABAG staff due to commitment to help industry.	<u>Direct Cost-Private</u> o No Impact. <u>Production of Goods and Services</u> o No Impact. <u>Income and Investment</u> o No Impact. <u>Consumer Expenditures</u> o No Impact.	<u>Housing Supply</u> o No Impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o No Impact. <u>Equity</u> o No Impact. <u>Sense of Community</u> o No Impact. <u>Urban Patterns</u> o No Impact.
<u>Air Quality</u> o No Impact. <u>Water Quality</u> o No Impact. <u>Physical Resources</u> o Direct impact on solid waste. Less likelihood of accidents or human error in storage, handling or disposal of hazardous wastes; eases clean-up should spill occur during transport. o Indirect benefit for source separation programs. <u>Energy</u> o No Impact. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: Enforcing proper labeling; EPA and State Health Department staff time. (Standards have not been set; cost estimates not available.) <u>Institutional</u> o Direct impact on public acceptance; unpopular with some generators of hazardous wastes due to costs of compliance.	<u>Direct Cost-Private</u> o Cost of labels, when needed <u>Production of Goods and Services</u> o No Impact. <u>Income and Investment</u> o Direct Impact on Investment for labeling equipment if needed. <u>Consumer Expenditures</u> o No Impact.	<u>Housing Supply</u> o No impact. <u>Physical Mobility</u> o No Impact. <u>Health and Safety</u> o Indirect Impact on public health; increases safety in handling of wastes by decreasing the likelihood of accidents and mistakes during handling. <u>Equity</u> o No Impact. <u>Sense of Community</u> o No Impact. <u>Urban Patterns</u> o No Impact.
<u>Air Quality</u> o May have effect on reducing odor and dust. <u>Water Quality</u> o No Impact. <u>Physical Resources</u> o Direct Impact on solid waste; increases safety of storage conditions. <u>Energy</u> o No Impact. <u>Amenities</u> o No Impact.	<u>Financial</u> o Direct Cost-Public: enforcing requirement; EPA and State Health Department staff time. (Standards have not yet been set; cost estimates not available.) <u>Institutional</u> o Direct Impact on public acceptance unpopular with some generators of hazardous wastes due to costs of compliance; more likely to affect small industries (since most large generators already have adequate facilities.)	<u>Direct Cost-Private</u> o Cost of better storage facilities, when needed. <u>Production of Goods and Services</u> o No Impact. <u>Income and Investment</u> o Direct Impact on Investment for purchasing and installing new storage facilities, when needed. <u>Consumer Expenditures</u> o No Impact.	<u>Health and Safety</u> o Indirect Impact on public health since increases safety while storing wastes by reducing likelihood of unwanted contact with hazardous substances. All other social impacts same as Action 13.1.
<u>Physical Resources</u> o Direct Impact on solid waste management by providing better data. o Indirect impacts; may result in decreased illegal disposal and more waste going to Class 1 sites. All other environmental impacts same as Action 13.1.	<u>Financial</u> o Direct Cost-Public: Enforcing requirement; EPA and State Health Department staff time. (Standards have not yet been set; cost estimates not available.) <u>Institutional</u> o Same as Action 13.1.	<u>Direct Cost-Private</u> o Cost of staff time and supplies to keep better records. <u>Production of Goods and Services</u> o Employment-Indirect Impact on employment since may create a very small number of jobs in larger companies. <u>Income and Investment</u> o No Impact. <u>Consumer Expenditures</u> o No Impact.	<u>Health and Safety</u> o Minor indirect beneficial impact on public health; may decrease the likelihood of illegal disposal. All other social impacts same as Action 13.1.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 13.4 Improve procedures for preventing and handling spills of hazardous wastes.	<p>a) Evaluate preventive measures for oil and chemical spills on land and recommend improvements as appropriate.</p> <p>b) Provide for training of firefighters in proper procedures for handling spills in County Emergency Services Plans.</p> <p>c) Designate a single responsible agency for each county for notification and handling of spills, such as the County Office of Emergency Services or the County Health Dept.</p>	<p>Appropriate Federal, State regional and local agencies.</p> <p>County Offices of Emergency Services.</p> <p>County & cities for each county.</p>	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p>	<p>Enabling legislation of the agencies.</p> <p>Local resolutions, as appropriate.</p> <p>Local resolutions, as appropriate.</p>	<p>\$ 1,200^a (\$14,000^a 1979)</p> <p></p> <p></p>	<p>\$ 1,200^a (\$14,000^a 1979)</p> <p></p> <p></p>	<p>Federal, State & local funds.</p> <p>State funds, DOT.</p> <p>Local funds.</p>	<p>After plan approval, cities & counties will adopt recommendations.</p>
Action 13.5 Ensure proper handling of hospital wastes.	Require that infectious or pathological wastes from hospitals be disposed through incineration or processed for disposal to sewers.	State Health Dept. and local health depts.	Completed by April 1980.	AB 1593 (1977).	\$ 2,900 ^a (\$33,000 ^a 1980-2000)	\$ 2,900 ^a (\$33,000 ^a 1980-2000)	RCRA; State funds.	State Health Dept. will implement.

^a Public cost.

^b Private cost.

^c Public and private costs.

Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Water Quality</u> <ul style="list-style-type: none">o Indirect Impact. Reduces likelihood of hazardous materials being washed into sewers or allowed to run off in next storm.	<u>Financial</u> <ul style="list-style-type: none">o Direct Cost - public: (Administrative costs) Counties and Cities (101) - 1979 Total for Region r= 6-3/8% \$9729 r= 10% \$9098 County Offices of Emergency Services (9) 1979 Total for Region r= 6-3/8% \$4335 r= 10% \$4054	<u>Direct Cost - Private</u> <ul style="list-style-type: none">o No impact. <u>Production of Goods and Services</u> <ul style="list-style-type: none">o No impact. <u>Income and Investment</u> <ul style="list-style-type: none">o No impact. <u>Consumer Expenditures</u> <ul style="list-style-type: none">o No impact.	<u>Health and Safety</u> <ul style="list-style-type: none">o Indirect Impact on public health by decreasing possibility of harm from spills both for persons responsible for clean-up and for the general public. All other social impacts are same as Action 13.1.
All other environmental impacts are same as Action 13.1.	<u>Institutional</u> <ul style="list-style-type: none">o Direct Impact on legal capability since requires nine separate resolutions.o Direct temporary impacts on allocation of local staff for firemen to obtain necessary training, emergency personnel to make changes in emergency plans, and staff to prepare resolutions.		

<u>Air Quality</u> <ul style="list-style-type: none">o Appropriate incineration would need to be monitored.	<u>Financial</u> <ul style="list-style-type: none">o Direct Cost - Public: (Administrative and regulatory costs) State Department of Health 1980-2000 Total r= 6-3/8% \$33,417 r= 10% \$24,182 (Development and enforcement of requirements)	<u>Direct Cost - Private</u> <ul style="list-style-type: none">o Cost of hospital staff time for preprocessing and occasional new equipment. <u>Production of Goods and Services</u> <ul style="list-style-type: none">o Employment - Indirect Impact on employment; temporarily to install any needed facilities; permanent to help with preprocessing. <u>Income and Investment</u> <ul style="list-style-type: none">o Indirect Impact due to capital required for new equipment and facilities. <u>Consumer Expenditures</u> <ul style="list-style-type: none">o Possible Indirect Impact due to increased cost to patients for hospital care.	<u>Health and Safety</u> <ul style="list-style-type: none">o Indirect Impact on public health; decreases possibility of accidental contact with pathological or infectious wastes. All other social impacts same as Action 13.1.
<u>Water Quality</u> <ul style="list-style-type: none">o Should ensure better treatment of infectious materials than landfill disposal.			
<u>Physical Resources</u> <ul style="list-style-type: none">o Direct impact on solid waste management; better preprocessing so can be incinerated or disposed of to sewers.o Indirect benefit of decreasing amount of materials going to land fills.	<u>Institutional</u> <ul style="list-style-type: none">o Indirect Impact on public acceptability; possibly unpopular to operators of hospital facilities due to associated costs.o Indirect impact on legal capability since requires amendment to the State Hazardous Waste Control Act (in process).o Direct Impact on allocation of State Dept. of Health staff due to need to enforce the requirements.		
<u>Energy</u> <ul style="list-style-type: none">o Appropriate incineration requires more energy than landfill disposal.			
<u>Amenities</u> <ul style="list-style-type: none">o No impact.			

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 13.6 Establish and enforce regulations for on-site disposal of hazardous wastes.	Establish a permit and monitoring system for on-site disposal of hazardous waste.	State Health Dept.; BAAPCO; RWQCB; county solid waste management agencies.	1978	AB 1593 (1977); agencies' enabling legislation; RCRA:	\$ 53,000 ^a (\$617,000 ^a 1980-2000)	\$ 53,000 ^a (\$617,000 ^a 1980-2000)	RCRA; State funds; Disposal fees.	EPA will implement RCRA.
Action 13.7 Provide funding for adequate enforcement.	Provide stable funding for adequate enforcement of existing regulations by State Dept. of Health and Counties, as appropriate, under RCRA and AB 1593 (1977).	State legislature; U.S. Congress.	As soon as possible.	RCRA	\$232,000 ^a (\$2,700,000 ^a 1979-2000)	\$232,000 ^a (\$2,700,000 ^a 1979-2000)	AB 1593 (1977); RCRA	ABAG will advocate.

^a Public cost.

^b Private cost.

^c Public and private costs.

Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o Indirect Impact on air quality since the dust and odors associated with disposal could be monitored more easily.

Water Quality

- o Indirect Impact since the appropriate criteria imposed on Class I sites could be applied.

Physical Resources

- o Indirect Impact on solid waste management; Improves the development and operation of on-site disposal facilities.

All other environmental impacts are same as Action 13.1.

Financial

- o Direct Cost - Public:

(Administrative and regulatory costs)

State Department of Health -

1980-2000	Total
r = 6-3/8%	\$585,196
r = 10%	\$460,688
(approximately \$30,000/year)	

BAAPCD

1980	Total
r = 6-3/8%	\$ 12,462
r = 10%	\$ 11,270

RWQCB

1980	Total
r = 6-3/8%	\$ 12,462
r = 10%	\$ 11,270

Counties and Cities (101)

1980	Total
r = 6-3/8%	\$ 4,075
r = 10%	\$ 3,685

Institutional

- o Indirect impact on public acceptability; possibly unpopular to generators of hazardous wastes that use on-site disposal due to perceived costs involved.
- o Direct impact since the legal capability of the State Dept. of Health to require and enforce such regulations is uncertain.
- o Direct impact on allocation of State Dept. of Health staff due to need to develop and enforce the requirements.

Direct Cost - Private

- o Indirectly, cost of on-site disposal facility modifications

Production of Goods and Services

- o Employment - Indirect Impact on employment, temporarily only, to install any needed facility modifications.

Income and Investment

- o Indirect Impact; capital required for any new facility modifications. Amount specific to each on-site disposal site.

- o Possible indirect impact on profits due to costs of compliance.

Consumer Expenditures

- o No Impact.

Health and Safety

- o Indirect Impact on public health since decreases the likelihood of improper disposal of hazardous wastes.

All other social impacts are same as Action 13.1.

See Impacts of Actions 13.1 - 13.6.

Financial

- o Direct Cost-Public:
(Administrative cost in addition to costs in recommendations 13.1 - 13.6.)

ABAG-

1979-2000	Total
r = 6-3/8%	\$2,143
r = 10%	\$1,972

Department of Health

1981-2000	Total
r = 6-3/8%	\$2,701,227
r = 10%	\$1,885,411

Institutional

- o Direct Impact on legal capability since Increases the chance of State and Federal legislation (or budget allocations) to establish.
- o Direct Impact on State Department of Health staff since funds would be available to hire additional necessary staff.

See impacts of Actions 13.1 - 13.6.

See impacts of Actions 13.1 - 13.6.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 14 FUTURE CLASS 1 DISPOSAL SITES AND FACILITIES SHOULD BE LOCATED SO THAT THEY DO NOT HAVE ADVERSE EFFECTS ON HUMAN HEALTH AND SAFETY, AIR AND WATER QUALITY, WILDLIFE, CRITICAL ENVIRONMENTAL RESOURCES AND URBANIZED AREAS.								
Action 14.1 If additional disposal capacity for hazardous wastes is needed (see Action 11.3), develop necessary arrangements that would lead to reservation and acquisition of site(s).	Pending the results of Action 11.3 convene affected counties to determine areas for further study and develop necessary inter-governmental and public-private arrangements for financing studies, reports, public review and site(s) reservation and/or acquisition.	Affected local jurisdiction(s) (to be determined) to be assisted by ABAG, SSWMB and State Dept. of Health if requested.	Ongoing	Local zoning authority; SB 424 (1977); RCRA	To be determined	None needed	After plan approval, cities (contingent on Action 11.3) adopt recommendations. Federal and State grants if Action 14.1 is needed.	After plan approval, cities & counties will adopt recommendations.
Policy 15 THE REGIONAL WASTEWATER SOLIDS STUDY RECOMMENDATIONS, WHEN COMPLETED, SHOULD BE INTEGRATED INTO LOCAL AND REGIONAL SOLID WASTE MANAGEMENT PLANS.								
Action 15.1 Complete the regional wastewater solids management plan.	Complete the regional plan for long-term wastewater solids management to become part of the regional solid waste management plan.	San Francisco Bay Region Wastewater Solids Study (WSS)	1978.	Federal Water Pollution Control Act (FWPCA) Amendments of 1972, Section 201; JPA of WSS.	\$64,000 ^a (\$752,000 ^a 1978)	0	Federal and State grants; local funds.	EPA and SWRCB will ensure implementation.
Action 15.2 Integrate the Wastewater Solids Study recommendations into regional and local solid waste management plans.	Integrate the Wastewater Solids Study recommendations into regional and local solid waste management plans. Regional issues identified in the regional wastewater solids management plan shall be addressed in the continuing planning process of the EMP.	ABAG in conjunction with SWRCB, RWQCB, other designated wastewater management agencies, and county solid waste management agencies.	Continuous after Dec. 1977	FWPCA Section 208; PL 95-217; RCRA; SB 424 (1977)	To be determined	To be determined	Federal grants.	EPA, SWRCB, and SSWMB will ensure implementation.
Policy 16 FACILITIES PLANNING, DESIGN, AND CONSTRUCTION FOR WASTEWATER SOLIDS MANAGEMENT SHOULD BE ACCOMPLISHED BY LOCAL WASTEWATER MANAGEMENT AGENCIES IN CONFORMANCE WITH THE COUNTY SOLID WASTE MANAGEMENT PLANS, THE ENVIRONMENTAL MANAGEMENT PLAN (208 PLAN), AND FEDERAL AND STATE REQUIREMENTS								
Action 16.1 Develop facilities plans (Step 1).	Develop facilities plans for wastewater solids management based on the regional wastewater solids plan.	Wastewater solids study will develop facilities plans for EBMUD, CCCSD, City & County of San Francisco, Cities of San Jose/Santa Clara; other wastewater agencies will develop their own facilities plans as necessary.	Dec. 1978 for initial facilities plans.	FWPCA Section 201; PL 95-217; RCRA.	\$ 78,000 ^a \$(912,000 ^a 1979)	0	Federal and State grants; local funds.	EPA and SWRCB will ensure implementation.
Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.								

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Physical Resources

- o Indirect impacts on solid waste management; decrease rate at which existing sites are filled and should ensure future Class I site capacity.

Energy

- o No impact.

All other environmental impacts are same as Action 11.3.

Financial

- o Direct Cost-Public:
Staff time of the affected local jurisdiction to reserve site, including general plan changes and critical area rezoning. (Costs contingent upon determination of need for Class I site.)

o See Action 11.3.

Same as Action 11.3.

Same as Action 11.3.

Institutional

- o See Action 11.3.

Air Quality

- o Indirect benefits since the plan would be in conformance with air quality goals and standards.

Water Quality

- o Indirect benefits since the plan would meet requirements for protection of ground and surface water quality.

Physical Resources

- o Direct benefits in management of wastewater solids.

- o Indirect benefits for surrounding ecosystems of disposal sites due to protection of surface and ground water quality.

Energy

- o Indirect benefits in energy production since the plan may include site specific co-combustion projects (with refuse).

Amenities

- o Indirect benefits since the plan would ensure mitigation measures for impacts related to amenities.

Financial

- o Direct Cost-Public:
(Administrative and Regulatory Costs-plan development)
San Francisco Bay Wastewater Solids Study-
1978 \$1,800,000 (partially spent)

- o Fiscal Effects on Local Government-
- Proposed projects included in the plan may be financed by general obligation or revenue bonds.
- Property tax rate may increase slightly
- Part or all of the proposed project would be grant eligible after plan approval.

Institutional

- o Implementation of regional plan may require JPA among municipal wastewater agencies.
- o Acceptable to wastewater treatment agencies and local solid waste management agencies.
- o Direct impact on involved agencies due to staff that must be reallocated to work on plan development.

Production of Goods and Services

- o The plan may recommend marketing of sludge.

Income and Investment

- o Proposed projects may provide additional income and require private investment.

Consumer Expenditures

- o Cost for implementing the plan would be passed on to the public

NOTE:

1. Wastewater Solids Study is doing an impact assessment that would be in much greater detail.
2. All impacts are possible, not probable, since recommended plan alternatives for Wastewater Solids Study have not been chosen.

Housing Supply

- o No impact.

Physical Mobility

- o No impact.

Health and Safety

- o The plan would be in compliance with health and safety standards to reduce hazards to public health.

Sense of Community

- o No impact.

Urban Patterns

- o The plan may help preserve marginal agricultural land from urban or suburban development.

Same as Action 15.1.

Financial

- o Direct Cost-Public:
(Costs included under Action 1.2.)

All other financial/institutional impacts same as Action 15.1.

Same as Action 15.1.

Same as Action 15.1.

See environmental impacts for Action 16.4.

Financial

- o Direct Cost-Public:
(Administrative costs of plan development)

1978 \$970,000

See economic impacts for Action 16.4.

See social impacts for Action 16.4.

SOLID WASTE MANAGEMENT PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 16.2 Review proposed facilities plans.	Review proposed facilities plans and approve those that are consistent with the regional solid waste management plan, and the 20 year project list in the 208 plan.	EPA, SWRCB, RWQCB, State Health Dept., ABAG, State, Clearinghouse.	1979.	FWPCA Sections 201 and 208, Office of Management and Budget-Circular A-95; SB 424 (1977); RCRA	\$ 4,000 ^a ((\$48,000 ^a 1978-2000)	0	Federal and State grants; State general funds.	Agencies will carry out existing review local and authorities.
Action 16.3 Design wastewater solids management facilities (Step 2).	Design wastewater solids management facilities according to the approved facilities plans.	Wastewater management agencies.	1979- FWPCA Section 201; 1980. 201; PL 95-217; RCRA		\$ 1,266,000 ^a (\$14,800,000 ^a 1979)	0	Federal and State grants; local funds.	EPA and SWRCB will ensure implementation.
Action 16.4 Construct wastewater solids management facilities (Step 3).	Construct wastewater solids management facilities according to the approved facilities plan.	Wastewater management agencies.	1981- FWPCA Section 201; 1982. 201; PL 95-217; RCRA		\$24,800,000 ^a (\$289,000,000 ^a 1980-2000)	0	Federal and State grants; local funds.	EPA and SWRCB will ensure implementation.
<p>^a Public cost.</p> <p>^b Private cost.</p> <p>^c Public and private costs.</p> <p>Note: Figures in parentheses are total costs expressed as present discounted value for recommended action throughout the period of implementation.</p> <p>*Costs are included in Action 5.1 of the Water Quality Management Plan.</p>								

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

See impacts for Action 16.4.

Financial

- o Direct Cost - Public:
(Administrative costs of reviewing facilities plans)

ABAG

1978-2000 \$400/year

Reviewing Agencies (7) -

1978-2000 \$3,750/year

See impacts for Action 16.4.

See impacts for Action 16.4.

Institutional

- o Reviewing agencies will have to allocate staff time to review plans.

See impacts for Action 16.4.

Financial

- o Direct Costs-Public:
(Administrative costs of facilities design)

1979 \$7,000,000 (committed funds)

1979 \$9,700,000 (funds not yet allocated - contingent on review and approval)

See impacts for Action 16.4.

See impacts for Action 16.4.

Air Quality

- o Direct temporary impact due to increase in dust level during construction.
- o Direct impact due to reduction in odor problems at new processing facilities.

Water Quality

- o Direct benefits since the construction of facilities would ensure adequate handling and disposal of wastewater solids to protect ground and surface water quality.

Physical Resources

- o Direct benefits in solid waste management.
- o Direct benefits for marginal agricultural lands if sludge is used for land application.

Energy

- o Direct adverse impact due to energy required for facilities construction and operation of facilities.

Amenities

- o Direct temporary, adverse impact due to noise associated with facilities construction.
- o Indirect adverse impact due to potential noise problems associated with operation of equipment at the facilities.

Financial

- o Direct Cost-Public:
(Costs of facility construction)

1980 \$70,000,00 (funds committed)

1980 \$97,000,00 (funds contingent upon review and approval)

(Costs of operation and maintenance)

1981-200 \$16,700,000/year

- o Fiscal Effects on Local Governments

- Facilities construction may be financed by general obligation or revenue bonds.

- Property tax rate may increase slightly.

- Federal and State grants may be available (up to 87½% of the construction cost).

Institutional

- o Facilities construction may require JPA or other agreements among wastewater management agencies and other public agencies.

- o Facilities construction may be viewed positively by wastewater management agencies and the public.

Production of Goods and Services

- o Employment - Temporary and permanent increase in employment due to construction and operation of facilities.

Income and Investment

- o Land application of sludge may require private investment, and marketing of sludge would require private investment.

Consumer Expenditures

- o Cost for facilities construction would be passed on to the public.

Housing Supply

- o No Impact.

Physical Mobility

- o No Impact.

Health and Safety

- o Construction of the needed facilities would improve the handling and disposal of sludge (thereby reducing health and safety hazards).

Sense of Community

- o Potential impact if odors or other nuisance or health problems accompany a facility.

Equity

- o No Impact.

Urban Patterns

- o If the facilities could facilitate land application of sludge, it may have indirect, minor benefits for preserving marginal agricultural land.

TABLE 7
HOW THE REGIONAL SOLID WASTE MANAGEMENT PLAN MEETS THE REQUIREMENTS OF SB 424 (1977)

SB 424 (1977) Requirements: A regional solid waste management plan shall be prepared and updated by ABAG. The regional plan shall be based primarily on county solid waste management plans.								
RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS							
	FEDERAL		STATE		REGIONAL		LOCAL	
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY
POLICY 1: THE REGIONAL SOLID WASTE MANAGEMENT PLAN SHOULD BE BASED PRIMARILY ON THE COUNTY SOLID WASTE MANAGEMENT PLANS, COORDINATED WITH STATE PLANNING AND INTEGRATED WITH AREAWIDE ENVIRONMENTAL MANAGEMENT PLANNING; PRIMARY RESPONSIBILITY FOR ADEQUATE SOLID WASTE MANAGEMENT SHALL REST WITH LOCAL GOVERNMENT.								
<u>Action 1.1</u> Carry out and update county plans as the basis of the regional solid waste management plan.							Counties with participation from cities and other local jurisdictions	State Senate Bill 5 (SB5)
<u>*Action 1.2</u> Coordinate the regional plan with state and areawide planning.					ABAG	SB424 (1977); RCRA; SSWMB Resolution 76-38; SB5; FWPCA Section 208		ABAG will be assisted by an inter-agency coordinating committee.

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
Identified Issue No. 1: Evaluation of large-scale resource recovery systems.

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 3: THE REGIONAL SOLID WASTE MANAGEMENT PLAN SHOULD FOCUS ON MULTIJURISDICTIONAL PROJECTS FOR WASTE REDUCTION AND RECOVERY OF MATERIALS AND ENERGY FROM SOLID WASTES									
Action 3.1 Review proposed resource recovery projects.	EPA	RCRA; FWPCA	SSWMB; State Clearinghouse	RCRA; SB5; Circular A-95	ABAG	SB424 (1977); FWPCA; Circular A-95			Review of projects will be coordinated through the A-95 process.
*Action 3.2 Develop additional information needed for resource recovery planning.	EPA	RCRA	SSWMB	SB5; RCRA; AB1395 (1976); SB650 (1977)	ABAG	SB424 (1977); RCRA; SB650	Cities and counties	RCRA; SB650; SB5	SSWMB will coordinate the development of additional information through the State planning process under RCRA.
POLICY 5: WHERE POSSIBLE, THE EXISTING PERMIT PROCESS SHOULD BE IMPROVED TO FACILITATE THE IMPLEMENTATION OF LARGE-SCALE ENERGY RECOVERY PROJECTS.									
*Action 5.1 Incorporate methods into existing permit process for large scale energy recovery facilities to make it more efficient and convenient.			All permitting agencies with responsibility for regulating energy recovery facilities.	Enabling legislation.	All permitting agencies with responsibility for regulating energy recovery facilities.	Enabling legislation.			Each permitting agency will review the permit process for large-scale energy recovery facilities.
*Action 5.2 Collect and make available information on existing permit procedures and on other permit coordination efforts.					ABAG	SSB424 (1977); Joint Powers Agreement of ABAG			ABAG will gather information from existing permitting agencies; prepare and update packets; tribute to county solid waste agencies; county agencies will provide to project proponents.

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
 Identified Issue No. 2: Development of dependable markets for recovered materials.

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION.
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 8: FACILI- TATE REGIONWIDE CO- OPERATION IN DEVEL- OPING STABLE, ADE- QUATE MARKETS FOR SECONDARY MATERIALS.									
*Action 8.1 Prepare and update listing of buyers.			SSWMB	SB5	ABAG	SB424 (1977); JPA of ABAG			SSWMB in cooper- ation with ABAG will implement the action in the Bay Area.
*Action 8.2 Provide forum for coordination.			SSWMB	SB5	ABAG	SB424 (1977); JPA of ABAG			SSWMB in cooperation with ABAG will im- plement the action in the Bay Area.
POLICY 9: FEDERAL, STATE AND LOCAL GOV- ERNMENTS SHOULD ADOPT LEGISLATIVE AND ADMINISTRATIVE CHANGES TO SUPPORT STABLE, ADEQUATE MARKETS FOR SECONDARY MATERIALS AND PRO- DUCTS MADE FROM THEM.									
*Action 9.1 Change existing Fed- eral and State laws and regulations to support stable, ade- quate markets for secondary materials and products made from them.	U. S. Con- gress and Federal Ad- ministration	U.S. Consti- tution	State Legisla- ture and Ad- ministration	State Consti- tution					Federal and State governments will make changes inde- pendently in most cases.
*Action 9.2 Adopt preferential purchasing policies for secondary mater- ials, where appro- priate.					ABAG; other regional agen- cies	JPA of ABAG; enabling le- gislation of other region- al agencies; AB1504 (1977)	Cities and counties; other public agencies	AB1504 (1977)	Each agency will implement the action independently.

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
Identified Issue No. 3: Assurance of hazardous wastes disposal capacity.

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 11: ADEQUATE PLANNING FOR HAZARDOUS WASTE MANAGEMENT REQUIRES ADEQUATE DATA.									
<u>*Action 11.1</u> Conduct surveys of hazardous industrial wastes.			State Dept. of Health; SSWMB	RCRA Sec. 3002 (6); State Hazardous Waste Control Act	ABAG	SB424 (1977); RCRA	Counties	RCRA; SB5	State Dept. of Health will implement this action with assistance from counties, SSWMB and ABAG.
<u>*Action 11.2</u> Conduct surveys of hazardous hospital wastes.			State Dept. of Health; SSWMB	Proposed State Hazardous Waste Control Act Amendments; RCRA	ABAG	SB424 (1977); RCRA	Counties	SB5	State Dept. of Health will implement this action with assistance from counties, SSWMB and ABAG.
<u>*Action 11.3</u> Determine whether there is a need for additional Class I site capacity.			State Dept. of Health; SSWMB	AB1573 (1977); AB598 (1972) RCRA	RWQCB; ABAG	RCRA; SB424 (1977)	Counties	SB5	State Dept. of Health will implement this action in conjunction with RWQCB, SSWMB, ABAG and the counties
POLICY 12: HAZARDOUS INDUSTRIAL WASTE REDUCTION, SOURCE SEPARATION AND RECOVERY SHOULD BE PROMOTED IN THE INTEREST OF LIMITING LAND DISPOSAL.									
<u>Action 12.1</u> Encourage hazardous waste reduction.			State Dept. of Health; SSWMB	AB1593 (1977); RCRA	RWQCB; ABAG	RCRA; SB424 (1977)	County solid waste management agencies	SB5	State Dept. of Health will implement this action with assistance from ABAG, SSWMB, RWQCB and county solid waste management agencies.
<u>Action 12.2</u> Encourage hazardous waste source separation.			State Dept. of Health; SSWMB	AB1593 (1977); RCRA	RWQCB; ABAG	RCRA; SB424 (1977)	County solid waste management agencies	SB5	See above.
<u>Action 12.3</u> Encourage hazardous waste resource recovery.	U.S. Congress EPA	U.S. Constitution	State Legislature; State Dept. of Health; SSWMB	State Constitution; RCRA; State Hazardous Waste Control Act; SB5	ABAG	RCRA; SB424 (1977)	County solid waste management agencies	SB5	Each affected agency will provide incentives to industry for resource recovery.

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
Identified Issue No. 3: Assurance of hazardous wastes disposal capacity.

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
<u>Action 12.4</u> Investigate the consolidation of hazardous wastes for processing.			State Dept. of Health; SSWMB	RCRA; State Hazardous Waste Control Act	RWQCB; ABAG	RCRA; SB424 (1977)	County solid waste management agencies	SB5	State Dept. of Health will implement this action with assistance from ABAG, SSWMB, RWQCB, and county solid waste management agencies.
POLICY 13: REGULATIONS SHOULD ENSURE SAFE AND PROPER HANDLING OF HAZARDOUS WASTES.									
<u>Action 13.1</u> Enforce proper labeling requirements	EPA	RCRA	State Dept. of Health	RCRA Sec. 3002 (2); State Hazardous Waste Control Act; AB1593 (1977)					State Dept. of Health will ensure implementation of this action.
<u>Action 13.2</u> Enforce adequate storage facilities requirements	EPA	RCRA	State Dept. of Health	RCRA Sec. 3002 (3); State Hazardous Waste Control Act; AB1593 (1977)					State Dept. of Health will ensure implementation of this action.
<u>Action 13.3</u> Enforce requirements for adequate record-keeping practices by waste generators.	EPA	RCRA	State Dept. of Health	RCRA Sec. 3002 (1); AB1593 (1977)					State Dept. of Health will ensure implementation of this action.
<u>Action 13.4</u> Improve procedures for preventing and handling spills of hazardous wastes.	Appropriate federal agencies.	Enabling legislation of the agencies.	Appropriate state agencies	Enabling legislation of the agencies.	Appropriate regional agencies	Enabling legislation of the agencies	County offices of Emergency Services; counties and cities for each county	Local resolutions as appropriate.	All appropriate federal state, regional and local agencies will work together to implement this action.
<u>Action 13.5</u> Ensure proper handling of hospital wastes.			State Dept. of Health	AB1593 (1977)			Local health departments	AB1593 (1977)	State Dept. of Health will have the primary responsibility for enforcement.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans. Identified Issue No. 3: Assurance of hazardous wastes disposal capacity.									
RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
<u>Action 13.6</u> Establish and enforce regulations for on-site disposal of hazardous wastes.			State Dept. of Health	AB1593 (1977); RCRA	BAAPCD; RWQCB	Agencies' enabling legislation	County solid waste management agencies	AB1593 (1977)	Each state and regional agency will establish and enforce regulations.
<u>Action 13.7</u> Provide funding for adequate enforcement	U.S. Congress	U.S. Constitution; RCRA	State legislature	State Constitution					U.S. Congress will appropriate funds for enforcement under RCRA and state legislature will supplement funding.
POLICY 14: FUTURE CLASS I DISPOSAL FACILITIES SHOULD BE LOCATED SO THAT THEY DO NOT HAVE ADVERSE EFFECTS ON HUMAN HEALTH AND SAFETY, AIR AND WATER QUALITY WILDLIFE, CRITICAL ENVIRONMENTAL RESOURCES AND URBANIZED AREAS.									
<u>*Action 14.1</u> If additional disposal capacity for hazardous wastes is needed (see Action 11.3), develop necessary arrangements that would lead to reservation and acquisition of site(s).			State Dept. of Health; SSWMB	RCRA	RWQCB; ABAG	RWQCB's enabling legislation; SB424	Affected local jurisdiction(s) (to be determined)	Local zoning authority	Affected local jurisdictions will be assisted by ABAG, SSWMB, and State Dept. of Health if requested.

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
Identified Issue No. 4: Wastewater solids management planning.

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 15: THE REGIONAL WASTE-WATER SOLIDS STUDY RECOMMENDATIONS, WHEN COMPLETED, SHOULD BE INTEGRATED INTO LOCAL AND REGIONAL SOLID WASTE MANAGEMENT PLANS.									
<u>*Action 15.1</u> Complete the regional wastewater solids management plan.					San Francisco Bay Regional Wastewater Solids Study (WSS)	FWPCA Sec. 201; JPA of WSS			The WSS is advised by other federal, state, regional and local agencies.
<u>*Action 15.2</u> Integrate the Waste water Solids Study recommendations into local and regional solid waste management plans.			SWRCB	FWPCB Sec. 201; PL95-217	ABAG; RWQCB	SB424; FWPCA Sec. 208; PL95-217; RCRA	Designated wastewater management agencies; county solid waste management agencies	FWPCA Sec. 201; SB5	ABAG in conjunction with SWRCB, RWQCB, other designated wastewater management agencies, and county solid waste management agencies.
POLICY 16: FACILITIES PLANNING, DESIGN AND CONSTRUCTION FOR WASTEWATER SOLIDS MANAGEMENT SHOULD BE ACCOMPLISHED BY LOCAL WASTEWATER MANAGEMENT AGENCIES, IN CONFORMANCE WITH COUNTY SOLID WASTE MANAGEMENT PLANS, THE ENVIRONMENTAL MANAGEMENT PLAN (208 PLAN), AND FEDERAL AND STATE REQUIREMENTS.									

*Actions which would assist counties in implementing county solid waste management plans.

SB424 (1977) Requirements: The regional plan shall address only those regional issues identified in the county plans.
Identified Issue No. 4: Wastewater solids management planning.

RECOMMENDED POLI- CIES AND ACTIONS TO MEET THE RE- QUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY AGENCY	LEGAL AUTHORITY	AGENCY AGENCY	LEGAL AUTHORITY	AGENCY AGENCY	LEGAL AUTHORITY	AGENCY AGENCY	LEGAL AUTHORITY	
<u>Action 16.1</u> Develop facilities plans (Step 1)	EPA	FWPCA Sec. 201 and 208	State Dept. of Health; State Clearinghouse; SWRCB	Circular A-95; FWPCA Sec. 201 and 208	Wastewater Solids Study	FWPCA Sec. 201 and 208; PL95-217; RCRA	Other wastewater agencies	FWPCA Sec. 201 and 208; PL95-217; RCRA	Wastewater Solids Study will develop facilities plan for EBMUD, CCCSD, City & County of S.F., Cities of San Jose, Santa Clara; other wastewater agencies will develop their own facilities plans as necessary.
<u>Action 16.2</u> Review proposed facilities					ABAG; RWQCB	Circular A-95; FWPCA Sec. 201 and 208; SB 424; RCRA			Reviews will be co- ordinated under the A-95 process.
<u>Action 16.3</u> Design wastewater solids management facilities (Step 2)							Wastewater management agen- cies	FWPCA Sec. 201; PL95- 217; RCRA	Each agency will im- plement projects in- dependently or jointly, if appropriate.
<u>Action 16.4</u> Construct waste- water solids management facil- ities (Step 3)							Wastewater man- agement agencies	FWPCA Sec. 201; PL95- 217; RCRA	Each agency will im- plement projects in- dependently or jointly if appropriate.

*Actions which would assist counties in implementing county solid waste management plans.

AB424 (1977) Requirements: The regional plan shall be consisted with the Air Quality Maintenance Plan (AQMP) and the areawide waste treatment management plan (208 plan).

RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 4: ALL SOLID WASTE DISPOSAL SITES MUST BE SITUATED, DESIGNED, OPERATED AND EVENTUALLY CLOSED DOWN IN A PROPER MANNER, TO PROVIDE PROTECTION TO THE SURFACE AND GROUND WATER QUALITY AND THE NATURAL ENVIRONMENT AS WELL AS PROTECTION OF PUBLIC HEALTH AND SAFETY.									
<u>Action 4.1</u> Accelerate the adoption and updating of the Waste Discharge Requirements			SSWMB	RCRA	RWQCBs	California Water Code Sections 13300 & 14040; California Admin. Code, Title 23, Chapter 3, Subchapter 15			RWQCBs will implement this action with co-operation from the SSWMB.
<u>Action 4.2</u> Issue and enforce permits for solid waste facilities and disposal sites			SSWMB; State Dept. of Health	AB2439 (1977); AB1593 (1977)			City and County enforcement agencies	AB2439 (1977); AB1593 (1977)	SSWMB and State Dept. of Health will delegate authority to city and county enforcement agencies where appropriate.

SB424 (1977) Requirements: Policies and programs for regional solid waste management shall be consistent with the state policy to protect the public health, enhance the environment and conserve its natural resources.									
RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 2: THE AMOUNT OF MUNICIPAL WASTE GOING TO BAY AREA LANDFILLS SHOULD BE REDUCED BY 30% BY 1982, WITH EMPHASIS ON JOB-INTENSIVE, INEXPENSIVE, SOURCE SEPARATION/RECYCLING MEASURES.									
POLICY 6: FEDERAL, STATE, AND LOCAL PUBLIC EDUCATION PROGRAMS ARE ESSENTIAL TO PROMOTE AWARENESS OF THE FEASIBILITY AND NEED FOR WASTE REDUCTION.									
<u>*Action 6.1</u> Federal and State governments should make funds available to support education programs for promoting waste reduction.	Federal Government	U.S. Constitution	State Government	State Constitution					Federal government will appropriate funds and state government will supplement with additional funds.
<u>*Action 6.2</u> Provide public information packets and multi-media programs on waste reduction. Introduce classes on waste reduction.					Regional agency as delegated by SSWMB.	RCRA	Local agencies as delegated by SSWMB.	Enabling legislation of local agencies	The SSWMB will delegate appropriate regional and local agencies including school districts.
POLICY 7: FEDERAL, STATE AND LOCAL GOVERNMENTS SHOULD ADOPT LEGISLATIVE AND ADMINISTRATIVE CHANGES WHICH PROMOTE WASTE REDUCTION, WHERE APPROPRIATE.									
<u>*Action 7.1</u> Change manufacturing standards and regulations where appropriate.	U.S. Congress and Federal Administration	U.S. Constitution	State Legislature and Administration	State Constitution					Federal and State governments in general will make changes independently.
<u>*Action 7.2</u> Advocate Federal and State legislation to promote waste reduction, where appropriate.					ABAG	JPA of ABAG			ABAG will advocate through the Executive Board of ABAG.

*Actions which would assist counties in implementing county solid waste management plan.

SB424 (1977) Requirements: Policies and programs for regional solid waste management shall be consistent with the state policy to protect the public health, enhance the environment and conserve its natural resources.									
RECOMMENDED POLICIES AND ACTIONS TO MEET THE REQUIREMENTS	RESPONSIBLE AGENCIES AND LEGAL AUTHORITY FOR THE RECOMMENDED ACTIONS								RELATIONSHIP AMONG VARIOUS AGENCIES IN IMPLEMENTING THE ACTION
	FEDERAL		STATE		REGIONAL		LOCAL		
	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	AGENCY	LEGAL AUTHORITY	
POLICY 10: ALL LEVELS OF GOVERNMENT SHOULD ENCOURAGE DEVELOPMENT OF SOURCE SEPARATION PROGRAMS, WHERE APPROPRIATE.									
<u>*Action 10.1</u> Provide information and assistance on source separation.			SSWMB	SB5	ABAG	JPA of ABAG			ABAG in cooperation with SSWMB will implement this action.
<u>*Action 10.2</u> Fund projects on source separation at the local, State and Federal levels.	U.S. Congress	U.S. Constitution	State Legislature, SSWMB	State Constitution					SSWMB will be the administering agency for grant funding.
<u>*Action 10.3</u> Establish office paper recycling program.					ABAG and other regional agencies.	JPA of ABAG; enabling legislation of other agencies	Local governments	Local governments' enabling legislation	Each agency will implement this action independently.
<u>*Action 10.4</u> Adopt resolutions supporting existing community source separation and recycling programs.					ABAG and other regional agencies.	JPA of ABAG; enabling legislation of other agencies	Local governments	Local governments' enabling legislation	City Councils, Boards of Supervisors, School district boards, County Solid Waste Management agencies will adopt resolutions independently.

*Actions which would assist counties in implementing county solid waste management plans.

Section-G

BIBLIOGRAPHY OF TECHNICAL MATERIALS

1. Solid Waste Technical Memorandum 1, Status of Existing Landfill Sites in the San Francisco Bay Region, March 1977.
2. Solid Waste Technical Memorandum 2, Existing Authorities for Hazardous Waste Management, April 1977.
3. Solid Waste Technical Memorandum 3, Action Program to Reduce Waste Generation and to Promote Source Separation and Recycling in the Bay Area, April 1977.
4. Solid Waste Technical Memorandum 4, Issues in Current Permit Approval System for Solid Waste Management Facilities and Disposal Sites, April 1977.
5. Solid Waste Technical Memorandum 5, Existing Practices for Hazardous Waste Management in the San Francisco Bay Area, May 1977.
6. Solid Waste Technical Memorandum 6, Current and Projected Quantities of Hazardous Industrial Wastes Produced in the San Francisco Bay Area, June 1977.
7. Solid Waste Technical Memorandum 7, Identification of Possible Class I Site Areas, July 1977.
8. Solid Waste Technical Memorandum 8, Elements of a Coordinated Permit Approval Process for Solid Waste Management Sites and Facilities, July 1977.
9. Solid Waste Technical Memorandum 9, Issues for Federal and State Legislative and Administrative Action to Promote Source Reduction and Resource Recovery from Solid Waste, August 1977.

Chapter VI
AIR QUALITY
MANAGEMENT

Section-A

PURPOSE OF THIS CHAPTER

This chapter describes a plan for dealing with the Bay Area's air quality problems. This Air Quality Maintenance Plan (AQMP) addresses air quality standards set by the State and Federal governments to protect public health. The plan proposes a range of controls to meet air quality standards. It sets forth an approximate time schedule for adopting and implementing these draft proposals if Federal deadlines are to be met. These deadlines are described in the Federal Clean Air Act Amendments of 1977. They require all areas of the country, including the Bay Area, to meet the air quality standards by 1982. Under special conditions, this deadline may be extended to 1987.

The AQMP is summarized in the next section. Sections C-F provide background information for the plan and describe the process for developing the proposals recommended. Much of the technical analysis to support the draft AQMP proposals is described in Section F. Section G details the draft plan recommendations. Lastly, Sections H, I and J summarize how the plan is to be implemented and enforced, what benefits and costs are associated with the plan, and what future work should be conducted in the continuing planning process.

The AQMP represents a cooperative, multi-agency staff effort over a period of approximately two years. Extensive technical analysis has been conducted to develop the plan. Section K provides a bibliography of selected AQMP support documents. Sections L and M contain other support materials.

Section-B

SUMMARY OF PLAN RECOMMENDATIONS

This plan addresses the problems of air quality. It is required by Federal law. This law--the Federal Clean Air Act Amendments of 1977--requires that all areas of the country, including the Bay Region, must meet established air quality standards by 1982. Under special circumstances for certain kinds of air pollution, the date for meeting the air quality standards can be extended to 1987. The measures needed to meet the standards and the schedule for implementation will undoubtedly cause wide discussion and controversy.

Many consider the Federal Act to be a good one--one that will lead to clean, healthy air in the Bay Area. Others consider the Act to be unrealistic and its requirements impossible to meet. This plan describes what actions would be needed to meet those requirements. The actions are set forth as proposals for satisfying the requirements of the Act. To complete the analysis, the benefits and costs associated with the proposed plan are identified.

INTRODUCTION

The major national impetus for formal air quality planning has been the Clean Air Act of 1970. This Act required each state to prepare state implementation plans for how ambient air quality standards were to be met by 1975, or 1977 at the latest. These Federal air quality standards have been established by the U.S. Environmental Protection Agency (EPA) to protect public health.

For a variety of reasons--technical, political, institutional, and legal--California has never had a completely acceptable (or "approvable") state implementation plan for the Bay Area. One pollutant in particular, photochemical oxidants (sometimes referred to as smog), has posed the most difficult problem for preparing an acceptable plan. Photochemical oxidants consist mostly of ozone (O_3). Oxidant is formed from the reaction of hydrocarbons and oxides of nitrogen in the presence of sunlight. In the Bay Area it is experienced regionwide with the most adverse levels occurring in the summer and fall months. Other air pollution problems also exist, however, and these will be described more fully in the following sections.

AIR QUALITY STANDARDS

Both the EPA and California Air Resources Board (CARB) have established ambient air quality standards to protect public health. Meeting these standards and ensuring their continued maintenance is the basic goal of the AQMP. Because the Federal and State standards are different, the strategies required to meet the two sets of standards are also different. Table 1 presents the Federal and California air quality standards.

Table 1. Federal and California Ambient Air Quality Standards

POLLUTANTS	AVERAGING TIME	CALIFORNIA STANDARDS	NATIONAL STANDARDS ¹
Photochemical Oxidants	1 Hr.	0.10 ppm	0.08 ppm
Carbon Monoxide	12 Hr.	10 ppm	
	8 Hr.		9 ppm
	1 Hr.	40 ppm	35 ppm
Nitrogen Dioxide	Annual Average		0.05 ppm
	1 Hr.	0.25 ppm	
Sulfur Dioxide	Annual Average		0.03 ppm
	24 Hr.	0.05 ppm ²	0.14 ppm
	1 Hr.	0.5 ppm	
Suspended Particulate Matter	Annual Geometric Mean	60 $\mu\text{g}/\text{m}^3$	75 $\mu\text{g}/\text{m}^3$
	24 Hr.	100 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$
Lead	30 Day Average	1.5 $\mu\text{g}/\text{m}^3$	
Hydrogen Sulfide	1 Hr.	0.03 ppm	
Hydrocarbons (Corrected for Methane)	3 Hr. (6-9 a.m.)		160 $\mu\text{g}/\text{m}^3$
Ethylene	8 Hr.	0.1 ppm	
	1 Hr.	0.5 ppm	
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%.	

1

National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

National primary standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each State must attain the primary standards no later than 1982. In the case of photochemical oxidants and carbon monoxide, extensions to 1987 at the latest may be granted if certain conditions set forth by the Clean Air Act of 1977 are met.

2

With simultaneous violation of State 1-hour oxidant standard or State 24-hour suspended particulate matter standard.

A brief summary of how each of the Federal and State standards was approached is presented below. It is important to note the distinction between Federal and State standards. Achieving and maintaining Federal air quality standards is required by Federal law; achieving and maintaining California air quality standards is adopted CARB policy. Fixed time schedules and interim requirements have been set for meeting the Federal standards. No such schedules or interim milestones exist for the California standards.

Photochemical Oxidants (Ox)

The Federal standard is more stringent and has been used as the basis for developing control strategies. To meet the Federal standard a comprehensive strategy is recommended, consisting of further technological controls for stationary and mobile sources along with transportation controls and improved land use management.

Carbon Monoxide (CO)

The Federal standards are more stringent than California standards. The 1-hour 35 parts per million (ppm) standard is not currently violated and is not expected to pose future problems. The 8-hour 9 ppm standard is violated in a number of localized areas throughout the Bay Region. Strategies to deal with these problems are best developed on a case-by-case basis. Such individualized strategies have not been conducted as part of the AQMP effort to date. These analyses are scheduled for 1978 (see Section J for a more detailed description).

Nitrogen Dioxide (NO₂)

The Federal standard is an annual average and has never been violated in the Bay Area. The California 1-hour standard is occasionally violated, mostly in the Santa Clara Valley. Because oxides of nitrogen can suppress oxidant formation (see Section F for detailed discussion), the control strategy recommended is a cautious one. Further controls of nitrogen oxides are recommended only after a more detailed examination of the problem reveals what the likely sources of the problem are and that the proposed solutions will indeed be effective to deal with the problem.

Total Suspended Particulate (TSP)

Both the 24-hour and annual mean California standards are more stringent than the corresponding Federal standards. In 1975, both Federal and California annual averages were exceeded at a few inland valley areas within the region. Wind blown dirt and dust contribute significantly to total suspended particulate values, raising the important issue of natural versus man-made contributions to the particulate problems. Because the particulate problem occurs in relatively few areas (e.g. Livermore) and natural contributions to monitored values are estimated to be quite significant, no specific recommendations are presented in this document. Until better data are available on the extent and causes of the problem, specific control recommendations should be

deferred. The localized particulate problems should be treated on a case-by-case basis with appropriate controls being developed for each of the localized violations. Like carbon monoxide, particulate problems tend to be quite localized, requiring detailed local analysis of the sources of the problem. Section J discusses total suspended particulate problems in more depth. It also recommends a program for developing the data necessary to more fully understand the causes of the problem and possible solutions.

Sulfur Dioxide (SO₂)

The Federal annual average and 24-hour standards are met by a considerable margin in the Bay Region. Recently, however, California adopted a new 24-hour standard which states violations require a simultaneous occurrence with either oxidant or total suspended particulate at violation levels as well. Using this new California standard, the Bay Area does not appear to have a serious sulfur dioxide problem. Because of the unique manner in which California is now defining the sulfur dioxide standard, projecting future problems (and thus possible solutions to the problems) poses special difficulties. These are presented in Section J as areas for future research work.

Other California Standards

Unlike EPA, California also has ambient air quality standards for lead, hydrogen sulfide, ethylene, sulfates, and visibility reducing particulates. Each of these pollutants poses problems for control strategy development. A considerable amount of work is needed to define the extent of the problems, inventory sources of the problems, project what future problems will be, and to develop control strategies for dealing with the problems. These tasks are recommended for the continuing planning process and are described in Section J. It should be noted that the Bay Area Air Pollution Control District has regulations for industrial emissions of lead and hydrogen sulfide.

Summary of Air Quality Standards

Setting air quality standards is a difficult task. It is a dynamic process with standards constantly undergoing review as new medical research becomes available. Some standards change and others are established. For example, during the course of this study, the California Air Resources Board adopted a new 24-hour sulfur dioxide air quality standard. Sometime in 1978, EPA is required to set a new short-term nitrogen dioxide air quality standard (assuming the medical evidence supports the need for such a standard to protect public health). The photochemical oxidant standard is currently undergoing an extensive review by EPA.

Under the Clean Air Act of 1977, regular reviews of all air quality standards are required. The Federal standards set under the Clean Air Act of 1970 have remained unchanged despite several independent scientific reviews of these standards in the early 1970's. Regardless of whatever controversy exist with the standards and the levels at which they are established, the standards are set according to Federal and State laws. The AQMP by addressing the standards is addressing Federal law and State policy.

PROBLEMS

In its simplest form, air quality problems are easily defined. The Bay Area is not meeting air quality standards. Both existing and projected problems

are of concern. The previous section which discussed the current standards touched upon the existing problems. Projected future problems are summarized below.

Photochemical Oxidants (Ox)

It is generally agreed that the most difficult air quality standard to meet in the Bay Region is the 1-hour 0.08 ppm photochemical oxidant standard. Hydrocarbon emissions which lead directly to oxidant formation were estimated to be approximately 1000 tons/day in 1975. Under existing control programs, hydrocarbon emissions are projected to decrease by about 20% in 1985 to approximately 800 tons/day. By 2000, the hydrocarbon emissions are again projected to be approximately 1000 tons/day, or roughly the same emission levels as 1975. Thus, since oxidant levels experienced in the Bay Area in recent years reach 2-3 times the standard, one would expect a modest improvement by 1985, followed by a slow deterioration to current oxidant levels again by the year 2000. Oxidants are clearly an existing and projected air quality problem.

Carbon Monoxide (CO)

A number of urbanized areas exceeded the federal 8-hour 9 ppm carbon monoxide standard in 1975, e.g. San Jose, San Francisco, Oakland, and Vallejo. Region-wide emissions were estimated to be about 4300 tons/day in 1975. Future emissions for 1985 and 2000 with existing programs are projected to be about 4000 tons/day and 5700 tons/day respectively. Since emissions are projected to increase significantly from 1975-2000, it would appear that carbon monoxide will continue to be a problem unless additional controls are adopted.

Carbon monoxide is a very localized air quality problem caused almost exclusively by motor vehicle exhausts. Control strategies for existing and projected carbon monoxide problems need to be developed for the specific areas violating the standard. The detailed studies of local carbon monoxide problems have not been conducted to date. Such work is currently scheduled for early 1978.

The Bay Area has been designated by EPA as a carbon monoxide non-attainment area. A description of the approach proposed to develop a carbon monoxide plan for the region is given in Section J.

Nitrogen Dioxide (NO₂)

Nitrogen dioxide is not currently a major problem in the Bay Area. The federal annual average of 0.05 ppm has never been exceeded. Oxides of nitrogen emissions projected for the region remain relatively constant over the 25 year planning time frame: 731 tons/day in 1975; 692 tons/day in 1985; and 721 tons/day in 2000. Thus, it is projected that the nitrogen dioxide Federal standard will not be violated in the future.

The California 1-hour 0.25 ppm nitrogen dioxide standard is violated several times a year, particularly in the south Bay Area. Technically, the most controversial issue facing the Bay Area is whether or not additional controls of nitrogen oxides should be implemented and if so, what controls are appropriate. This issue is extremely complex. Its resolution has implications for oxidant

control strategies throughout California as well as many other areas of the country. What is recommended in the AQMP is that further nitrogen oxides controls be approached in the Bay Region with considerable caution.

Total Suspended Particulates (TSP)

Both Federal and State 24-hour and annual geometric mean standards for total suspended particulate are violated in different parts of the region with varying frequency. Since the State standards are more stringent, they are violated more frequently. Particulate problems tend to be localized. Thus, a knowledge of the sources contributing to the problem is desirable so that a discriminating and effective control program can be developed.

Devising such control programs is quite complex. There are many sources of particulate matter. From natural sources, particulate matter can come from ocean salt, soil particles, pollen, plant and insect parts. More comes from man's activities, however, from:

- combustion products in domestic, commercial, manufacturing, transportation, and agricultural activities
- rubber tires, brake linings and roadway dust from vehicle movements
- natural dusts raised by mining, quarries, agriculture and construction
- man-made particulate such as sawdust, paint spray and manufactures

All of the particulate sources cited above are primary sources, or particulate matter released directly into the atmosphere. Secondary sources of particulate matter (sometimes referred to as secondary aerosols) can also come from the formation of liquid or solid particulates by reactions of gases in the atmosphere.

Overall, the information currently available to develop an effective and discriminating control strategy for the particulate problem is not available. The data deficiencies are cited in Section J along with what information is available. Specific recommendations for work to be conducted to fill these data gaps are proposed. Such work should be completed prior to developing a regional total suspended particulate control strategy.

Sulfur Dioxide (SO₂)

Sulfur dioxide emissions come mostly from the industrialized areas of Contra Costa County. Even here, however, both Federal 24-hour and annual average sulfur dioxide standards are not violated. In fact, the 1975 annual average high for the region was less than 40% of the Federal standard.

Because less natural gas is anticipated, sulfur dioxide emissions are projected to increase substantially in 1985 and 2000. The 219 tons/day estimated for 1975 are projected to increase to 435 tons/day in 1985 and 414 tons/day in 2000. The major factors influencing the projected sulfur dioxide emissions are State and Federal energy policies. For example, if the CARB petition

to the California Public Utilities Commission were granted to allow natural gas from the Bay Area to be diverted to Southern California, sulfur dioxide air quality in the Bay Area would be degraded. Federal energy policies, some of which are currently being debated in Congress, may have other effects. In a separate study, ABAG is currently examining what potential impacts alternative energy policies might have on Bay Area air quality. Draft findings from this study will be available in March, 1978.

The current State 24-hour sulfur dioxide standard was violated once in 1975. By simply examining the sulfur dioxide emission trends, one would expect it will also be violated in the future. However, no model (simple or complex) currently exists to support such a statement. Thus, all that can be said regarding future violations of the State standard is they are likely to occur.

The newly defined sulfur dioxide standard poses special problems for air quality planning and control strategy development, namely:

- Projecting future air quality
- Estimating the effectiveness of control measures

These issues are proposed for detailed examination and resolution in the continuing planning process.

ALTERNATIVE SOLUTIONS

Future air quality improvements can be achieved in a variety of ways. To date, many stationary and mobile source controls have been implemented. Similarly, some transportation and development controls have been instituted to affect air quality. In developing alternative solutions to the existing and projected air quality problems, more than a hundred control measures were examined.

These measures were subjected to a screening by the AQMP Joint Technical Staff and the AQMP Advisory Committee. The measures remaining after the initial screening were examined more closely. As measures were analyzed in more detail, further screening was conducted and control strategies were formed. Section E describes in considerable detail, both the process and the results of the analysis of alternative control measures. Alternatives considered but not included in the plan are described with a rationale for why the measures were not included.

THE PLAN

This document is a plan for solving the photochemical oxidant problem in the Bay Area. More work is still to be conducted. This is especially true for carbon monoxide, total suspended particulate and sulfur dioxide, and other California designated air pollutants. This later work will constitute part of the continuing planning process.

The plan deals with the two regionwide air quality problems which local and regional governments can most directly influence--photochemical oxidants and nitrogen dioxide. The oxidant problem in particular cannot be solved without a broad based strategy supported and implemented by all levels of government--local, regional, State and Federal. The oxidant problem is considered

by most to be the most difficult problem facing the Bay Area. Its solution is required by law. The Bay Area, working together cooperatively with State and Federal governments can plan and implement the solutions. Alternatively, the State and Federal government must plan and implement the solutions for the Bay Area.

Recommended Actions

A broad based strategy of additional technological controls for stationary and mobile sources and transportation system improvements is set out in the plan. Some measures are direct, others are indirect. All are needed for meeting and maintaining the air quality standards.

A summary of the measures is provided below. The detailed description of measures and their effects on future air quality is given in Section F and G. The actions are basically divided according to implementing authority and/or responsibility.

Stationary Source Controls. Two basic programs would be carried out by the Bay Area Air Pollution Control District in the AQMP. Both programs are controversial and will require considerable expenditures, primarily from private industry. These programs are:

- o Use of available control technology (ACT) for new and existing industries.
- o A review (and permit program) of new and modified air pollution sources to ensure use of ACT and a determination of the source's contribution to further violations of air quality standards. Permits are issued or denied on the basis of meeting the criteria specified in the Bay Area Air Pollution Control District's regulations. (The District has had some form of new source rule regulation in effect since 1972. It is currently reviewing the rule to consider options such as emission offsets.)

Mobile Source Controls. These programs are basically hardware oriented or technological approaches to reducing vehicle emissions. Three programs are recommended for consideration by the California Air Resources Board. If carried out, these programs would result in lowered emissions from new passenger cars and trucks, periodic inspections of cars to keep them running as clean as possible, and lowered emissions from trucks currently in use.

For long term maintenance of the photochemical oxidant standard, after 1985-87, consideration would be given to reducing hydrocarbon emissions from small gasoline engines and/or from off-highway mobile sources.

Transportation Improvements. A variety of transportation system improvement measures would reduce the amount of vehicle travel within the region. These would be carried out by many agencies. The programs provide incentives to use transit and carpools. The measures include: additional transit service, increased bus and carpool lanes with ramp metering, more ride sharing services (e.g. jitneys and vanpools), and more extensive bicycle systems.

Effects of the Plan

A number of alternative strategies have been analyzed. A broad based strategy, involving controls for stationary and mobile sources as well as transportation system improvements, has been developed. This strategy includes requiring permits for new and modified sources of air pollutant emissions (commonly referred to as the New Source Review rule). These requirements for permits could result in lower emissions than would be the case without new source review. The permits would be issued on a project-by-project basis. Therefore, the resulting reductions in emissions cannot now be estimated. The reductions will depend on the specifics of the permit regulations. Without considering these reductions, the controls in the broad based strategy will almost reduce emissions enough to meet the 0.08 ppm oxidant standard in 1985. The additional reduction in emissions required to meet the standard can be achieved through the application of the new source review regulations. This regulation provides flexibility to the plan. An initial strict regulation can be changed and relaxed to some degree after it has been demonstrated that steady and further progress is being made toward meeting the air quality standard. As the attainment deadline dates approach and more data are available on air quality trends, the New Source Review program can be reviewed to examine its overall effectiveness and whether the program should be relaxed or made more stringent.

The AQMP projections in 2000 (without New Source Review), assuming implementation of a broad based strategy, show violation of the oxidant standard. Again, continued application of this program could result in sufficient emission reductions to ensure long term maintenance. Year 2000 projections are inherently subject to greater uncertainty than 1985. Thus, the need for more (or possibly less) controls of hydrocarbons in 2000 can be examined again in subsequent AQMP updates.

Benefits and Costs of the Plan

There are numerous benefits and costs associated with carrying out the plan. The major benefit will be clean, healthy air for the region. This will be especially important to children, elderly, and individuals with respiratory ailments. This plan will virtually eliminate people's exposure to oxidant levels in excess of the standard.

There are other benefits. Tens of millions of dollars will be saved annually from slower deterioration or aging of paints, clothing, rubber goods, and other products. Large savings are estimated for the agricultural industry in the Bay Area for products including grapes, spinach and flowers.

Implementing the plan would also mean less motor vehicle travel. This in turn would result in significant energy savings, reduced road maintenance costs and fewer traffic accidents.

There are direct and indirect costs related to the plan also. Private industry will be required to invest tens of millions of dollars annually for the available control technologies. The cars produced will have more sophisticated control equipment on them, and will no doubt be more expensive. For older cars, more repairs may be needed following the annual inspection and maintenance check up. Driving the private auto would be somewhat more expensive. This should be partially off-set, however, by fuel savings.

Overall, large uncertainties exist in the estimates of both the benefits and costs. In some instances, the projected effects will be overstated, and in other cases, they will be understated. A more detailed discussion of these anticipated effects and costs are provided in Section I.

Section-C

BACKGROUND OF THE PLAN

The Federal Clean Air Act of 1970, and more recently the Clean Air Act Amendments of 1977, set forth a series of stringent requirements for air pollution control. Each state is required to prepare detailed state implementation plans demonstrating how specific air quality standards are to be met. These standards have been set to protect public health. In a similar but separate manner, California has also set ambient air quality standards, again to protect public health. Under California Air Resources Board policy, these standards are to be met as soon as it is reasonably possible.

Many California regions, including the Bay Area, have exceeded some or all of the Federal and State air quality standards. Thus, the need for a plan. The Air Quality Maintenance Plan (AQMP) recommends a regional air quality strategy to meet Federal requirements and adopted State policy.

THE GOAL

When the AQMP planning process began, the Clean Air Act of 1970 was in effect. At that time it was clear that the requirements of the 1970 legislation could not be met, namely the attainment of federal air quality standards by 1977 and maintenance thereafter. Anticipating that amendments to the Clean Air Act of 1970 were soon forthcoming, the Environmental Management Task Force (EMTF) adopted the following goal by resolution in early 1977:

"The goal of the Air Quality Maintenance Plan is attainment and maintenance of Federal and State air quality standards as expeditiously as practicable."

In August of this year, Congress passed and the President signed into law the Clean Air Act Amendments of 1977. The new law, as anticipated, provides additional time for areas with severe air pollution problems to meet the previously prescribed air quality standards. California is now required to provide for the attainment of Federal air quality standards no later than December 31, 1982. The 1977 Amendments do provide in areas with especially severe oxidant and carbon monoxide problems (such as the Bay Region) that the deadline for meeting the Federal standards may be extended to as late as December 31, 1987. This extension can be granted only if all reasonably available control measures have been implemented. For example, a schedule for implementing a motor vehicle inspection and maintenance program is specifically required. In addition, the revised state implementation plan must show "reasonable further progress" and any new or modified stationary sources must operate at the "lowest achievable emission rate" for its industrial category.

AIR QUALITY STANDARDS

As noted previously, two sets of ambient air quality standards exist in the Bay Area. The U.S. Environmental Protection Agency set Federal standards

and the California Air Resources Board has set State standards. Both sets of standards are intended to protect public health from the adverse effects of air pollution. The standards have been summarized in Table 1.

Ambient air quality standards have always been controversial. They have been criticized both as being too permissive (not sufficiently protective of public health) and too stringent (or overly protective of public health). Because the medical research supporting air quality standards is always being updated, these standards are periodically reviewed. Since 1971, when the Federal air quality standards were set, these standards have remained unchanged. During the past six years, several reviews of the Federal standards have been conducted.

The 1977 Amendments require the following actions be taken regarding Federal air quality standards:

- Not later than December 31, 1980, and at five-year intervals thereafter, the Environmental Protection Agency shall thoroughly review the air quality standards and revise them as appropriate. Such reviews may be conducted earlier or more frequently than specified above. For example, the photochemical oxidant standard is currently under review by EPA.
- The reviews described are to be conducted by an independent scientific review committee with recommendations to the Environmental Protection Agency on both new standards and/or revisions of existing standards as appropriate.

The AQMP presented in this document assumes the Federal and State air quality standards shown in Table 1 are to be met. The control strategy implications for meeting both Federal and State air quality standards are presented in Section F.

LEGAL REQUIREMENTS

In 1976, the Environmental Protection Agency published regulations for the preparation, adoption, and submittal of state implementation plans to deal with long-term maintenance of Federal air quality standards. Basically, these regulations require the following tasks be conducted:

- Projection of emissions into the future
- Allocation of emissions according to estimated projections of location
- Calculation of air quality resulting from the future emission pattern
- Development of a control strategy to maintain the federal air quality standards
- Adoption of regulations to make the control strategy enforceable

The above approach has generally been used in developing the AQMP. In some cases, as noted in Section G describing the plan, it has not been possible to complete all of the tasks required. These instances are noted along with a discussion of the air quality issues raised. Section H discusses specific requirements set forth by the Clean Air Act of 1977.

PREVIOUS PLANNING

Air pollution control programs, have been actively pursued in the Bay Area since the 1950's. However, the major impetus for formal air quality planning began with passage of the Clean Air Act of 1970. Under this Act, states were given primary responsibility for developing and submitting to EPA a state implementation plan which contained measures to meet Federal air quality standards. If a state failed to submit a plan which was acceptable, EPA was required to prepare such a plan.

In the San Francisco Bay Region, the California Air Resources Board directed the Bay Area Air Pollution Control District to prepare various air pollution control strategies as part of the initial state implementation plan. Based on these controls and others added by the California Air Resources Board, the State of California prepared and submitted its plan to the Environmental Protection Agency in 1972. The plan was found deficient. One of the deficiencies cited by the Environmental Protection Agency in the state implementation plan was the failure to include adequate control strategies for transportation related pollutants--in particular, carbon monoxide and photochemical oxidant.

Following a court decision on the plan's inadequacies, the Environmental Protection Agency directed California to submit a transportation control plan for the Bay Area to reduce auto-related pollutants. The purpose of the transportation controls was to reduce auto emissions to a level which would allow meeting air quality standards. Because of the severity of the oxidant and carbon monoxide problems, transportation control plans were really a misnomer for control strategies dealing with stationary and mobile sources.

The deadline for submitting the transportation control plan in the Bay Area was very short. Acting in response to a court order, the Environmental Protection Agency Administrator in March 1973 notified the Governor of California that a plan should be submitted by April 15, 1973. The tight deadlines, combined with the severe air pollution problems to be dealt with, led to California defaulting on its responsibility to prepare an "acceptable" transportation control plan and state implementation plan.

When California failed to submit a transportation control plan as requested, the Environmental Protection Agency promulgated its own in November 1973. The plan showed that a 97% reduction in travel in the Bay Area would be needed to meet the air quality standards. The Environmental Protection Agency plan included traffic controls, other mobile source emission controls and extensive stationary source controls. To achieve the 97% reduction in travel, limitations on gasoline sales or gas rationing, was proposed. While the Environmental Protection Agency expressed serious reservations about the feasibility of a gas rationing program, it stated the Clean Air Act left the Environmental Protection Agency Administrator with no other legal alternative but to include such a strategy.

Recognizing the unsatisfactory nature of the Environmental Protection Agency plan, the State exercised its option to prepare and substitute its own plan. In the Bay Area responsibility for development of a transportation control plan was delegated to the Metropolitan Transportation Commission. The plan was developed under the direction of the Metropolitan Transportation Commission Traffic Coordinating Council. Membership of this Council is structured to represent the diverse interests of the region.

The plan was completed in early 1975. It was adopted by the Metropolitan Transportation Commission as part of their regional transportation plan. Various transportation control strategies, short and long-term, were presented in the transportation control plan with an analysis of their implications on air quality. Because the plan was unable to demonstrate meeting the air quality standards, it was not accepted by the California Air Resources Board. Transportation controls to reduce the amount of travel within the region decrease in effectiveness as motor vehicle emission controls become more effective. This fact contributed to the State failure to adopt these programs as part of its plan.

In summary, the current AQMP planning effort is intended to satisfy a number of requirements, including:

- Previous deficiencies of the transportation control plan and state implementation plan for meeting air quality standards;
- Federal regulations that strategies developed will show continued maintenance of air quality standards once attained; and
- Recently enacted requirements of the 1977 Clean Air Act for state implementation plan revisions to show attainment of air quality standards by 1982, or at the latest 1987.

EXISTING AND PLANNED PROGRAMS

Many control programs for air pollution currently exist. More are scheduled to be implemented in coming years. Before an examination of potential solutions to our present and projected problems can be conducted, a thorough understanding is needed of existing and planned air pollution programs. These programs have been organized primarily according to implementing authority and/or responsibility.

Stationary Source Emission Controls

In the San Francisco Bay Region, the Bay Area Air Pollution Control District (BAAPCD) has been empowered to control air pollution from stationary sources. Since its formation in 1955, the District has developed air pollution control programs for many categories of stationary sources.

To date the BAAPCD has enacted eight regulations, and six of these affect stationary sources. Some of them directly control air pollution by limiting the emissions of specific pollutants, either on a mass flow rate or concentration basis. Other regulations indirectly control pollutants by curtailing open burning, new source construction and expansion of existing stationary sources. Some sections deal specifically with emissions of odorous substances and others limit the density of smoke which may be emitted to the atmosphere. The regulations of the BAAPCD have been expanded and modified through the years, and are generally acknowledged to be among the most stringent in the United States. A brief description of present regulations follows.

Regulation One, adopted in March 1957, bans backyard trash burning and dump fires. It lists allowable types of fires and limits agricultural burning to favorable meteorology days designated "burn days" by the District.

Regulation Two, first adopted in May 1960, has eighteen different divisions. It includes controls on particulate matter (smoke particles and dust), sulfur compounds, lead, nitrogen oxides, and odorous substances from industrial and commercial sources. Permit and new source review requirements are also included in Regulation 2. The requirement for vapor recovery systems at service stations is part of the permit regulation.

The District's permit requirements, set out in Division 13 of Regulation Two, require anyone wishing to build or expand a source that emits air contaminants to first apply to the BAAPCD for a permit to build, and submit plans and specifications for evaluation by District engineers. Permits to build or modify will be denied if it is determined that the project would not meet any of the District's emission requirements or would cause any air quality standard to be exceeded in the vicinity of the proposed site. A second evaluation is required after the source is built before it can obtain a permit to operate. Division 13 also requires vapor recovery controls for service stations.

Regulation Three, originally promulgated in 1967, was developed to control emissions of organic compounds, in particular "reactive" organics which are relatively quick to react with nitrogen oxides in the atmosphere and form photochemical oxidant. Olefins, substituted aromatics, branched chain ketones and trichloroethylene are examples of reactive organic compounds controlled under this regulation. Regulation Three affects the formulation, storage, shipment and use of such materials as solvents, paint, gasoline and ink.

Regulation Four, June 1971, does not deal with stationary source controls. Now obsolete, it required installation of crankcase emission control devices on certain automobiles.

Regulation Five, adopted March 21, 1974, defines three levels of air pollution episodes and specifies actions to be taken by the Air Pollution Control Officer. Certain corrective control measures are invoked to discourage further buildup of contaminants in the atmosphere. Included in Regulation 5 is a requirement that source operators submit, in advance, standby plans for reducing emissions during air pollution episodes.

Regulation Six, 1974, does not affect stationary sources. It gives members of the BAAPCD vehicle patrol authority to arrest individuals observed to be violating those provisions of the vehicle code relating to automobile emissions.

Regulation Seven, December 1974, sets emission standards for new or modified sources of air pollution, following EPA guidelines. These sources include fossil fuel power plants, larger incinerators, cement plants, acid plants, refineries, smelters and steel plants.

Regulation Eight, December 1974, establishes limits for the emission of asbestos, beryllium and mercury, defined as hazardous pollutants by the EPA. Sources of asbestos are allowed no visible emissions. The beryllium standard limits emissions to not more than 10 grams per 24-hour period. For mercury the limit is no more than 23 grams/24 hours.

Because of the historical development process, the present system of regulations has become somewhat unwieldy. A complete reorganization is presently being studied and is expected to make the regulations easier to understand and apply.

Motor Vehicle Emission Controls

The California Air Resources Board (CARB) is the State agency responsible for coordinating both State and Federal air pollution control programs in California. This responsibility includes regulation of pollutant emissions from motor vehicles and coordination of local programs for stationary source control.

Due to the severity of air pollution problems in California, the federal government gives the State the option of enforcing motor vehicle emission standards which are more stringent than federal emission standards. Thus, while the Environmental Protection Agency takes primary responsibility for motor vehicle emissions control, the CARB can and has adopted and enforced emission standards more stringent than required at the Federal level. This section summarizes CARB responsibilities for mobile source control.

The CARB currently has regulations which control emissions from light, medium and heavy duty gasoline powered vehicles, diesel powered trucks and buses, and motorcycles. In addition, the CARB has in effect various regulations and procedures to ensure that emission standards are met. Table 2 presents current vehicle emission standards adopted by the CARB. Recently enacted federal statutes are also presented for comparison.

Transportation Controls

The following transportation control projects are currently operating in the San Francisco Bay Area. Some were required as elements of the transportation control plan, while others are the result of regional transportation planning.

1. Ramp and Mainline Metering:

I-580 - Beaumont Avenue eastbound on-ramp in Oakland;

I-280 - 5 northbound on-ramps between Winchester Road and Route 85 in San Jose. Wolfe Road on-ramp provides bypass for buses and carpools of 2 or more.

Rt. 101 - 5 northbound on-ramps between Capitol Avenue and Route 17 in Santa Clara County;

Rt. 17 - 23 northbound and southbound on-ramps between Route 9 and Route 101 in Santa Clara County;

Bay Bridge - In March 1974, an overhead metering system was installed just beyond the toll plaza at a cost of \$350,000. This system has maximized the operational efficiency of the bridge.

Table 2. Federal and California Motor Vehicle Emission Standards

Passenger Cars (Light Duty Vehicles)

Model Yr.	Standard	Test	Emissions (gm/mi)		
			HC	CO	NOx
1974	State	CVS-72	3.2	39	2.0
	Federal	CVS-72	3.4	39	3.0
1975-76	State	CVS-75	0.9	9.0	2.0
	Federal	CVS-75	1.5	15	3.1
1977-79	State	CVS-75	0.41	9.0	1.5
	Federal	CVS-75	1.5	15	2.0
1980	State	CVS-75	0.41	9.0	1.0
	Federal	CVS-75	(0.4)*	7.0	2.0
1981 and After	State	CVS-75	0.41	9.0	1.0
	Federal	CVS-75	(0.4)*	(3.4)*	1.0

* Numbers in parenthesis are estimated 90% reduction from 1970 standards.

Motorcycles**

Model Yr.	Standard	Displacement (D, in cc)	Emissions (gm/km)	
			HC	CO
1978-79	State and Federal	$50 \leq D < 170$	5.0	17
		$170 \leq D < 750$	$5.0 + 0.0155(D - 170)$	17
		$750 \leq D$	14	17
1980-81	State and Federal	$D \geq 50$	5.0	12
1982 and After	State	$D \geq 50$	1.0	12
	Federal	$D \geq 50$	5.0	12

**CARB Bulletin, April 1977; in the amended Clean Air Act of 1977, Section 202 (a) (3)(F) motorcycles are classed with heavy duty vehicles.

Table 2. (Con't) Federal and California Motor Vehicle Emission Standards

Light Duty Trucks

Model Yr.	Standard	Test	Equivalent Inertial Weight	Emissions (gm/mi)		
				HC	CO	NOx
1974	State	CVS-72	All	3.2	39	2
	Federal	CVS-72	All	3.4	39	3
1975	State	CVS-75	All	2.0	20	2.0
	Federal	CVS-75	All	2.0	20	3.1
1976	State	CVS-75	All	0.9	17	2.0
	Federal	CVS-75	All	2.0	20	3.1
1977-79	State	CVS-75	All	0.9	17	2.0
	Federal	CVS-75	All	1.5	15	2.0
1980	State	CVS-75	< 4000 lbs.	0.41	9.0	1.5
	State	CVS-75	> 4000 lbs.	0.5	9.0	2.0
	Federal	CVS-75	All	(0.4)*	7.0	2.0
1981 and After	State	CVS-75	< 4000 lbs.	0.41	9.0	1.0
	State	CVS-75	> 4000 lbs.	0.50	9.0	1.5
	Federal	CVS-75	All	(0.4)*	(3.4)*	1.0

* Numbers in parenthesis are estimated 90% reduction from 1970 standards.

Medium Duty Vehicles (CVS-75 Test)

Model Yr.	Standard	Equivalent Inertial Weight*	Emissions (gm/mi)		
			HC	CO	NOx
1978-79	State	All	0.9	17.0	2.3
	Federal	All (< 6000 lbs.)	1.5	15	2.0
1980	State	All	0.9	17.0	2.3
	Federal	All (< 6000 lbs.)	(0.4)***	7.0	2.0
1981 and After	State	< 4000 lbs.	0.41	9.0	1.0
	State	4000-5999 lbs.	0.50	9.0	1.5
	State	> 6000 lbs.	0.60	9.0	2.0
	Federal**	All (less than 6000 lbs.)	(0.4)***	(3.4)***	1.0

* Federal standards deal with only two categories, those less than 6,000 lbs. (light duty) and those greater than or equal to 6,000 lbs. (heavy duty).

** See heavy duty vehicle standards for heavier vehicles.

*** Numbers in parenthesis are estimated 90% reduction from 1970 standards.

Table 2. (Con't) Federal and California Motor Vehicle Emission Standards

Heavy Duty Vehicles

State Standards (gasoline and diesel)

Model Yr.	HC	Emissions (gm/BHP hr.)		HC + NOx
		CO	NOx	
1974	-	40	-	16
1975-76	-	30	-	10
1977-78 either or	1.0	25	7.5	5
		25		
1979 either or	1.5	25	7.5	
		25		5
1980-82 either or	1.0	25		6.0
		25		5.0
1983 and After	0.5	25		4.5

Federal standards (from Clean Air Act Amendments of 1977)

The Federal standards for 1974-78 heavy duty vehicles are identical to the State 1974 standards.

1979-82 "... shall contain standards (for CO, HC and NOx) which reflect the greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the model year..." Section 202 (a)(3)(B)

1983 and after for HC and CO, 90% reduction from, ..."the actually measured emissions from heavy duty gasoline fueled vehicles or engines, or any class or category thereof, manufactured during the baseline model year (1968)."

1985 and after for NOx, 75% reduction from the average of, ..."the actually measured emissions from heavy duty gasoline fueled vehicles or engines, or any class or category thereof, manufactured during the baseline model year (1972)."

Also, particulate standards are called for in 1981.

The following two projects will be constructed soon:

Rt. 101 - 5 northbound on-ramps between Route 17 and Fair Oaks Boulevard in Santa Clara County;

Rt. 101 - Upgrade five northbound on-ramps between Capitol Avenue and Route 17.

2. Preferential Bus/Carpool Lanes on Freeways:

Rt. 101 - Marin County Exclusive Bus Lanes. In 1972, a 3.9 mile northbound contra-flow exclusive bus lane was opened just north of the Golden Gate Bridge for use during the period 4 to 7 p.m. Approximately 100 buses use the lane, carrying about 4500 persons. In 1974 the project was extended north an additional 3.8 miles when concurrent-flow bus lanes were opened in both directions. Carpools were later allowed to use these lanes.

Rt. 280 - In October 1975, a two mile bus/carpool lane was opened on southbound I-280 in San Francisco from Sixth Street to approximately one-half mile south of Army Street. Approximately 200 carpools and 12 buses use this lane during the evening peak.

Rt. 580 - A bus/carpool lane is about to open through the Dublin Canyon. A study of the feasibility of the extending this to the Bay Bridge is underway.

S.F. - In San Francisco bus lanes are in operation on Post and Sutter Streets between Van Ness and Taylor. Approximately 60 buses use these lanes during the peak periods. Muni has reported improved schedule adherence. A bus lane has also opened along Mission Street.

3. Toll Incentives:

Bay Bridge - In December 1971, with flow carpool and bus lanes were opened at the westbound approach of the toll plaza. In 1975 carpool tolls were eliminated. During the 6 to 9 a.m. peak period, 430 buses and 2,200 carpools use the priority lane.

San Mateo-Hayward and Dumbarton Bridges - Toll free preferential lanes for buses and carpools were opened on both these bridges. Approximately 52 carpools and 40 buses use these lanes during commute periods.

Golden Gate Bridge - The Golden Gate Bridge District began allowing carpools to use the bridge toll-free in 1976. Approximately 1100 carpools use this lane.

Toll Revenues - AB 664 gave the Metropolitan Transportation Commission authority over the level and use of tolls on the trans-bay bridges. The Commission has recently raised the tolls and is using the excess revenue for transit.

4. Carpool Matching Program:

RIDES - is a program operated by Caltrans District 04 to promote carpooling in the San Francisco Bay Area. A non-profit corporation funded by Caltrans, the Federal Energy Administration and Metropolitan Transportation Commission, is currently being set up to expand this program. A survey conducted in 1975 indicated that approximately 5000 persons had formed carpools as a result of the program.

5. Improvement of Transit Service:

AC/BART - Coordinated Fare - The AC/BART transfer system provides for free transfers from BART to AC.

MUNI/BART Coordinated Fare - The MUNI/BART transfer system provides two tickets for MUNI bus rides for 25¢, a savings of one-half the full regular fare.

Santa Clara - Santa Clara Transit District was formed in 1972. Operations commenced in 1975 with 233 buses. The District also operated 9 buses for "Commute Specials"--these are used by some of the corporations.

Bus Pre-emption - A bus pre-emption system is to be installed along a portion of Almaden Expressway. Twelve signalized intersections are involved. The traffic signal equipment is under construction.

San Mateo County - San Mateo Transit District was formed in 1974 and operations commenced in July 1976. Two hundred buses provide service to and within most cities in San Mateo County including a connecting service between most cities in San Mateo County including a connecting service between the Daly City BART station and San Francisco Airport. Buses also served Southern Pacific Stations in the county.

Marin County - In 1970 Golden Gate Transit introduced a new ferry service between Sausalito and San Francisco. Additional service was added in December 1976 between Larkspur and San Francisco. Two additional ferries have gone into service this year.

Napa County - Napa County introduced a Dial-A-Ride system which is designed to provide local transit service in three communities: St. Helena, Calistoga and Napa. The service is provided using one bus.

Sonoma - Mini-bus operates in Sebastopol. Transit service in Santa Rosa is provided by 13 buses, which operate approximately 40 minutes apart.

Solano - In August 1975, the City of Fairfield implemented a Dial-A-Ride program using 5 vans. The service area is seven square miles with a population of 40,000.

AC Transit - AC Transit now provides contract city services in Concord, Pleasant Hill, and Moraga/Orinda. AC Transit also connects with Santa Clara County Transit District buses at Fremont BART station.

6. Preferential Parking:

San Francisco - Caltrans is in the process of leasing 4 state parking lots for carpool use. There would be 580 stalls available, open only to carpools of 3 or more. The fee would be not more than \$10/month.

The experience with transportation programs is valuable. The carpool incentives seem to be successful. The transit additions are also rather significant, but the problems of financing are becoming critical. Despite these incentives, auto travel has not really decreased. This would indicate that some combination of auto restraints and more transit/carpool incentives is needed.

Land Use Management/Development Controls

This term as traditionally used is a misnomer since measures dealing with land use, or land development, include a wide array of non-regulatory devices from the general plan of cities and counties to the service commitments of special districts. The more current and more widely used term "growth management" also means many different things in many different jurisdictions. Hence, in the ABAG Environmental Management Plan we use the terms "development policy" or "development strategy" to signify the land development objective sought, and the term "policy instruments" to mean the measure or tools of implementation.

Land Development Policy As Currently Carried Out in the Bay Region. The implementation of land development policy includes the wide array of things local governments are doing to accommodate the growth as they individually foresee it. Development policy in each locality is a function of what local governments--cities, counties, and service districts--are doing with their legal and fiscal tools to regulate or manage land development. It is also how they support developments with essential urban services such as sewers, water, and roads. Information on the current operating policies of local service providing and regulatory agencies was inventoried in ABAG's 1976 Local Development Policy Survey.

Development policy in local jurisdictions of the Bay Region means more than the general plans of cities or counties. The general plans and their zoning counterparts have been supplemented by capital improvement programs, special tax programs (e.g. Williamson Act Agricultural Preserves), specialized regulations in hazardous areas (e.g., slopes and flood plains), building permit allocation programs, and other programs. In some cases cooperative programs are in effect among cities, counties, and special districts to apply their individual policy instruments jointly to accomplish common development and service objectives.

ABAG Series 3 Projections of Population, Employment and Land Use. ABAG has used the inventory of local development policy as an important part of its Series 3 projections. The projections indicate what the short and long term changes are likely to be in the region if current local land development policy continues unchanged to 2000.

The Series 3 Projections account specifically for a wide array of local growth management programs. This was accomplished by a three phase survey conducted jointly by ABAG and the nine Bay Region counties. The ABAG 1976 Local Development Policy Survey contacted almost 400 local agencies including about 200 city agencies, 73 county agencies, and 125 independent special districts. Seventy-seven of the Bay Region's 93 cities responded along with 52 county agencies and 59 independent special districts. The results from the mail-back questionnaire were used to identify the key policies and policy instruments for in-depth examination in subsequent interviews.

Table 3 summarizes the results of the questionnaire survey. It presents policy instruments now in use to support development, constrain development, or both. On the basis of the number of jurisdictions using them, without regard to the size of the jurisdictions, the following general conclusions are noted:

- a) Among development supporting instruments, assessment districts, redevelopment programs, and capital improvement programs for transportation, sewer, and water systems are the most common. Redevelopment incentives such as tax incentives or other special land reserves with service commitments are relatively rare but do exist as precedents for more widespread application in the region.
- b) Among development constraining instruments open space zoning (and easements), public land acquisition, sewer connection limits and zoning moratoria are most prevalent; numerically transportation access limits, building permit moratoria, and prime agricultural land preserves are of secondary importance.
- c) In the category of instruments that can be used to constrain or support development, the LAFCO spheres of influence dominate (see summary below).

Implications of Regional Growth on Current Development Policy. The implications of regional growth on current development policy are documented at length in the ABAG report on the Series 3 Projections. In summary, development policies concerning industrial growth are out of balance with those related to residential growth. Industrial land reserves far exceed the projected need to 1990. Residential land reserves based on service commitments and regulations are insufficient for the apparent need beyond 1990, assuming the highest probable regional growth trend; and insufficient in some areas even assuming the lowest probable regional growth trend.

These projected trends indicate the importance of development timing and how timing controls are important in developing regional land use alternatives for air quality improvements.

Table 3. Summary of Land Development Policies in Effect - Bay Region 1975

Land Development Policy Instruments (In rank order by frequency regionwide within group)	Number of Jurisdictions Using			
	Total Active	Prior to 1970	1970 to 1975	Expect by 1977
<u>Group 1 Supporting Development</u>				
Assessment (Improvement) Districts	34	30	4	1
Public Assisted Housing Programs	25	12	13	2
Redevelopment Programs	15	7	8	8
Transportation Extension C.I.P.	21	16	5	4
Sewer Extension Capital Improvement Program	14	10	4	5
Public Housing Programs	9	6	3	1
Water Extension Capital Improvement Program	8	8	0	1
Low Income Housing Program	8	3	5	6
Special Service Commitments	6	5	1	2
Sale of Public Land	6	5	1	0
Industrial/Commercial Land Reserve (other than zoning)	0	0	0	3
<u>Group 2 Neutral or Mixed (used to support or constrain Development)</u>				
City Spheres of Influence (by LAFCO)	39	12	27	0
Development Fees	37	27	10	1
User Charges	32	27	5	0
Cluster Zoning	28	21	7	3
Slope/Density Zoning	21	6	15	6
Plan Conformance Rezoning	19	1	18	14
Mass "Up" or "Down" Zoning	11	1	10	8
Development Rights-Purchase or Transfer	8	5	3	4
Land Banking	3	-	3	2
Development Sequence Zoning	4	4	0	4
"Floating Zones"	3	3	0	3
<u>Group 3 Constraining Development</u>				
Open Space Zoning	26	5	21	8
Open Space Easements	23	5	18	4
Zoning Moratorium	18	8	10	5
Sewer Connection Limits	20	9	11	3
Land Acquisition for Public Use	20	12	8	1
Prime Agricultural Land Preserves	11	5	6	1
Building Permit Moratorium	11	0	11	0
Watershed Protection Program	13	8	5	1
Transportation Access Limits	12	7	5	2
Water Connection Limits	7	4	3	3
Other Utility Connection Moratorium	7	7	0	0

Source: Preliminary tabulations ABAG Local Policy Survey, 8/15/76. 65 cities reported of 76 responding. Special districts not included.

HOW THE PLAN WAS PREPARED

A variety of agencies implement programs for controlling air pollution. Many other agencies directly or indirectly influence air quality through public decisions. Future air quality in the region will continue to be affected by Federal, State, regional and local actions regarding:

- The kinds of cars we drive
- The amount and type of industry in the region
- Infrastructure investment decisions for roads, sewers, and water
- The location of jobs and housing
- The level of public transportation available

With this as background, it is evident that an implementable AQMP has to involve those individuals, groups, and agencies directly affected by the plan. In particular, the plan has to involve those agencies primarily responsible for implementing and enforcing the plan's recommendations. A constraint is the program must be manageable to complete the work program tasks within a reasonable amount of time.

The AQMP was prepared by a Joint Technical Staff made up of staff from five agencies. The Association of Bay Area Governments (ABAG) assumed overall program management responsibilities. The Bay Area Air Pollution Control District (BAAPCD) and Metropolitan Transportation Commission (MTC) provided direct support to ABAG under contract. The California Air Resources Board (CARB) and Caltrans provided in-kind staff support for the duration of the study.

Overall guidance to the AQMP-Joint Technical Staff came from several groups:

- Interagency Management Committee - Upper level management representatives from ABAG, BAAPCD, and MTC met periodically to review the progress of the study and provide program guidance as needed.
- AQMP-Advisory Committee - An independent advisory committee with broad regional representation was established to critique and review the AQMP efforts. This body also provided the opportunity for any interested individuals or groups to comment on the development of the AQMP.
- Program Review Board - This group of Federal and State agency officials reviewed progress of all management plans being developed, including the AQMP. Overall program policy guidance was given as requested or needed.

In addition to the AQMP-Joint Technical Staff, specialized air quality modeling assistance was provided in two ways:

- Consultant contracts with the Lawrence Livermore Laboratory (staff support) and the Lawrence Berkeley Laboratory (computer support)
- An air quality modeling committee was established to review and critique the air quality modeling work. This committee was composed of modeling

experts from the California Air Resources Board, U.S. Environmental Protection Agency, Lawrence Livermore Laboratory, Bay Area Air Pollution Control District, Metropolitan Transportation Commission, California Department of Transportation, Systems Applications, Inc. (air quality modeling consultant), and Association of Bay Area Governments.

Overall, the AQMP represents the work of a number of agencies drawing upon many specialized disciplines. The staff and data resources used to prepare the plan have been considerable. Both the process and the results of the planning effort are documented in various technical memoranda, issue papers, and briefs. Because of budgetary constraints, more specialized reports and memoranda have not been widely produced and disseminated. Individuals interested in detailed aspects of different parts of the AQMP should contact ABAG for further information.

Section-D

THE PROBLEMS, CAUSES AND FUTURE PROSPECTS

Any problem should be well defined before solutions are developed to solve it. Thus, prior to developing air quality control strategies, it is important to:

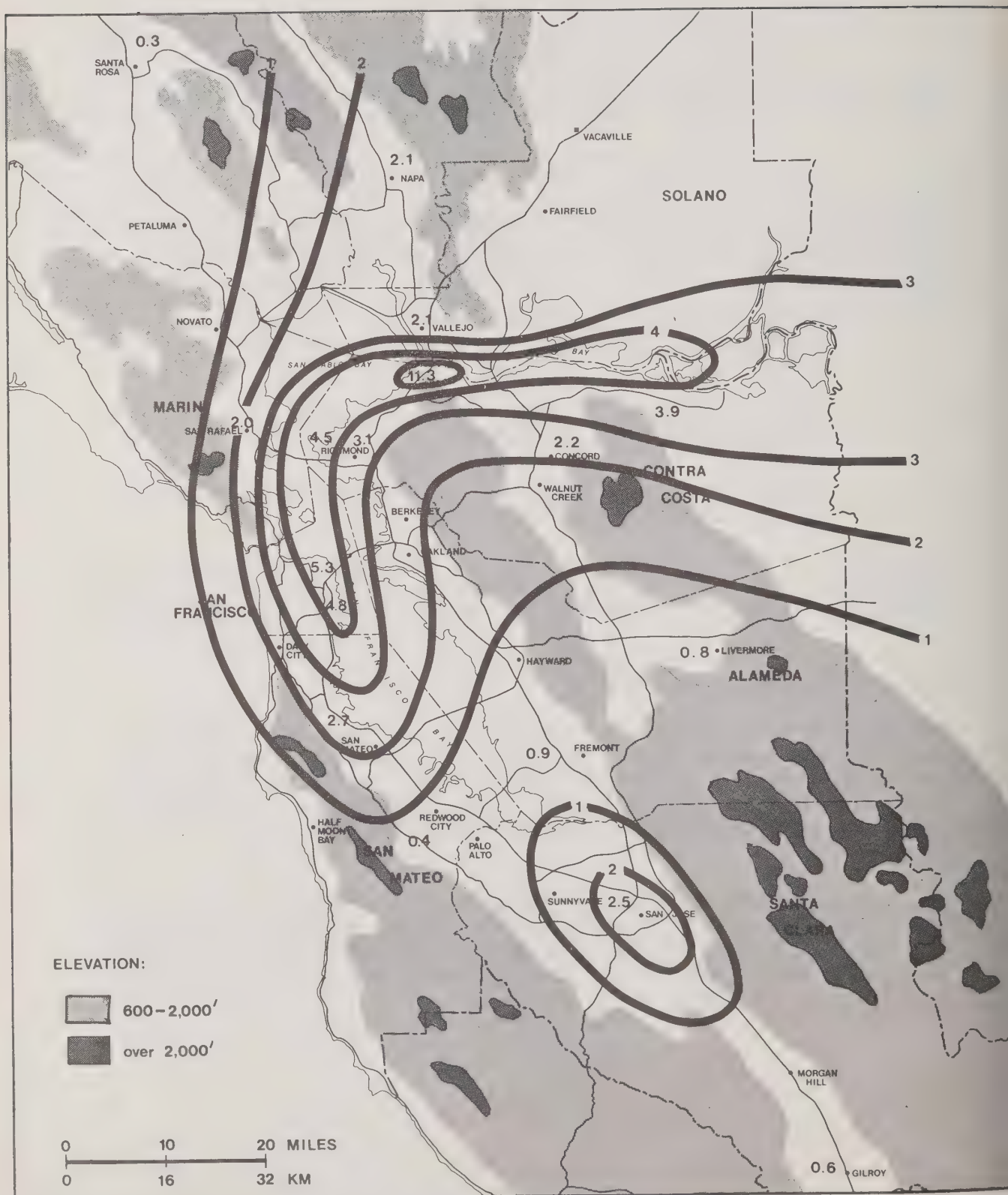
- Define the problem, or assess what past and present air quality levels have been with respect to air quality standards.
- Survey the causes, or inventory past and present emissions contributing to the problem.
- Assess future prospects, or project what future emissions and air quality are likely to be.

If future problems are projected, control strategies clearly need to be developed. This chapter defines what the magnitude and extent of future problems is likely to be and what the principal causes of the problem are.

PAST AND PRESENT AIR QUALITY

The Bay Area Air Pollution Control District maintains and operates an extensive air quality monitoring network throughout the region. Data are collected regularly for pollutants which have air quality standards established. These data are periodically summarized and by reviewing annual reports, it is relatively straightforward to define current problems.

The five pollutants of greatest interest to the region are sulfur dioxide (SO_2), total suspended particulate (TSP), carbon monoxide (CO), nitrogen dioxide (NO_2) and photochemical oxidants (Ox). Brief summaries of what past and present (1975-76) air quality levels were experienced in the Bay region are given below.



1975 Annual Average Sulfur Dioxide Values in parts per billion (ppb). Federal standard is 30 ppb.

Figure 1

Sulfur Dioxide

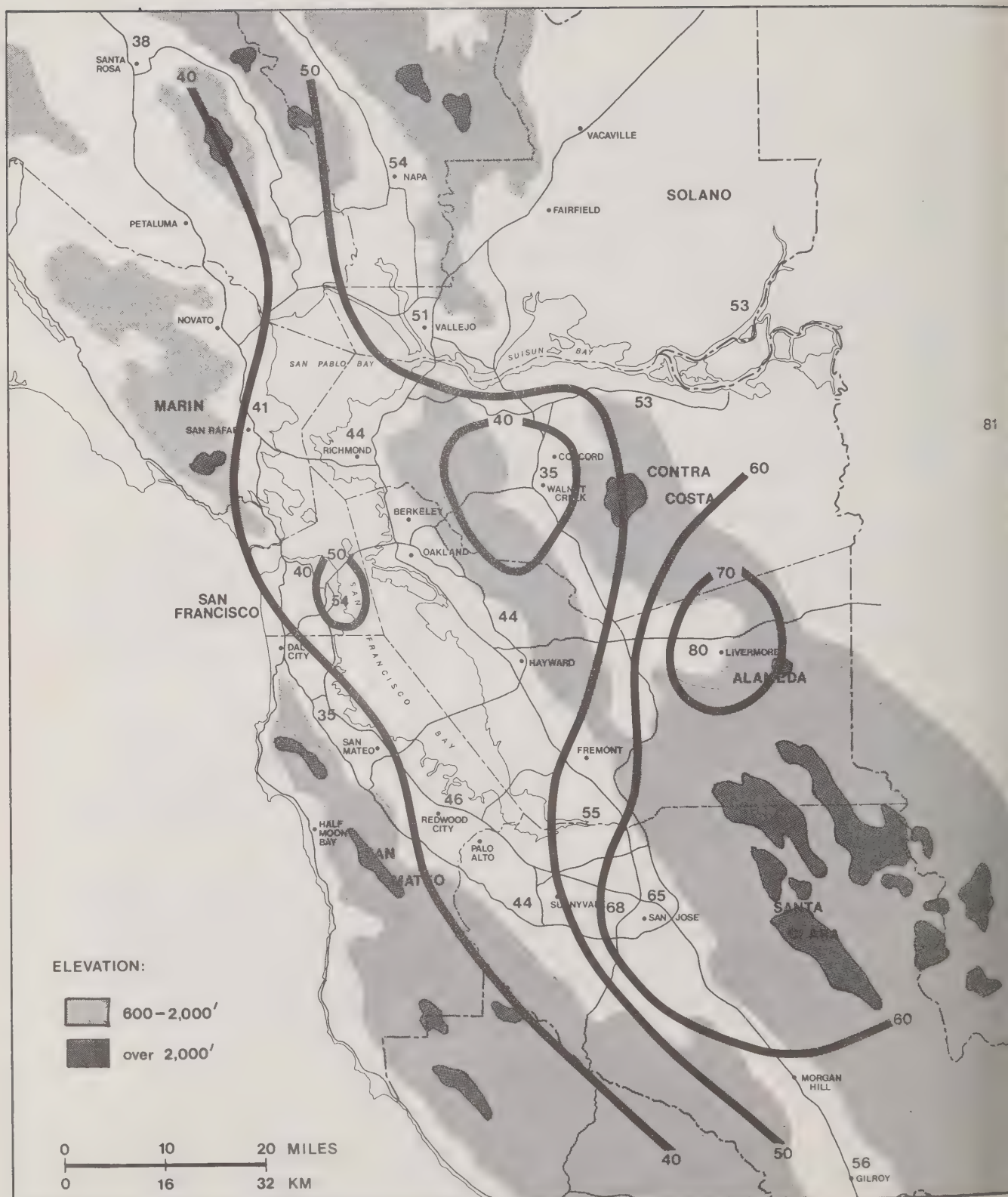
The map of annual average sulfur dioxide values for 1975 shows a relatively narrow band exceeding 3 parts per billion (ppb) centered on the shores of Contra Costa County with extensions to the San Francisco Airport and into the Delta. The Federal standard for sulfur dioxide (SO₂) annual average is 30 ppb, thus most of the Bay Area has less than one-tenth the SO₂ levels allowed by the Clean Air Act. The annual average for all District stations is 2.1 ppb, or 7% of the Federal standard.

The regional maximum of 11.3 ppb is recorded at Crockett, near a chemical plant which manufactures and ships SO₂ as its major product. Even here the annual levels are 60% below the Federal annual standard and encompass a small largely unpopulated area. The one 1975 excess of the State one-hour standard (.5 ppm, or 500 ppb) occurred at Crockett in July. However, there were numerous excesses of the District 3-minute regulation, which has a time frame 20 times more restrictive than the State standard and 60 times more restrictive than the Federal standard.

This annual average is a composite of varying seasonal patterns. In July and August, for example, the highest SO₂ values are at Pittsburg and the Delta, associated with summer air flow patterns. In December and January, drainage flow from the Central Valley along the Contra Costa shore carries the maximum SO₂ averages to San Francisco. A minor secondary maximum over San Jose occurs in September and October, apparently related to local food processing.

The SO₂ in the atmosphere is eventually considered converted to sulfate after extended residence and travel time, and a State sulfate standard of 25 µg/m³ has been established. For 7 years the District has also monitored sulfate and has recorded only one excess of this standard. The pattern of highest sulfate corresponds very closely to that for SO₂, with mean values over 3 µg/m³ in an arc along the Contra Costa shoreline.

The 1975 SO₂ average is 63% lower than that for 1969 when this monitoring program began. Despite the energy-related fuel-switch problems of 1973-74, the 3-year average for 1973-75 is 39% lower than that for 1969-71, due to stringent District control of major point sources. Projected decreases in global availability of clean fuels suggest increasing difficulty in maintaining the current low levels of sulfur gases.



1975 Annual Geometric Means of Total Suspended Particulate in $\mu\text{g}/\text{m}^3$ (by hi-volume method with fiberglass filters). Federal primary standard is $75 \mu\text{g}/\text{m}^3$. State standard is $60 \mu\text{g}/\text{m}^3$.

Figure 2

Total Suspended Particulate

The annual geometric means (AGM) of total suspended particulate (TSP) show a pattern of low values near the coast increasing with distance inland, particularly into dry sheltered valleys. The values are given in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) which is a measure of weight. The Federal primary standard, expressed as an annual geometric mean is $75 \mu\text{g}/\text{m}^3$ and the State standard is $60 \mu\text{g}/\text{m}^3$. In 1975 the Santa Clara and Livermore Valley areas exceeded the State standard, and the Livermore Valley also exceeded the Federal standard.

The most respirable and visibility-reducing particles are very small, with diameters of 0.1 - 0.5 microns (or 0.0000039 - 0.0000197 inches), and their contribution to total weight is small in relationship to their significance. (One 5 micron particle affects the TSP value as much as 1000 of the 0.5 micron particles). Thus this standard is not an ideal guide to particulate problems. Seven years of District particulate species data show that large silicate particles contribute heavily to the TSP values at our more inland stations such as Livermore.

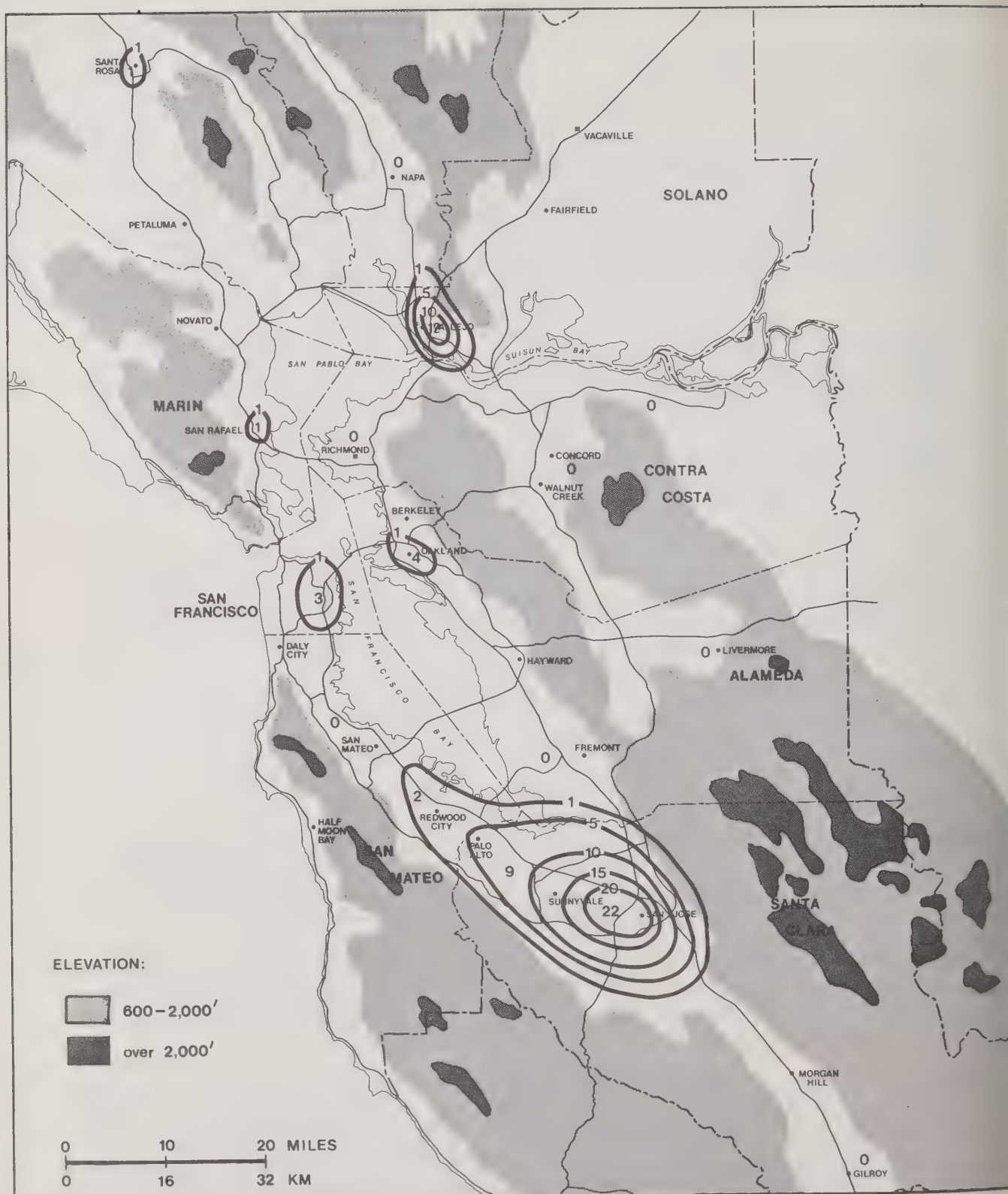
Another widely employed but less precise measure of particulate is the Coefficient of Haze (COH) method, for which no standards have been established, but which relates much better to visibility reduction. Here it is interesting to compare the 1975 COH and TSP annual geometric means for three District stations:

	<u>TSP, AGM</u>	<u>COH, AGM</u>
Sunnyvale	44	0.27
Livermore	80	0.27
Richmond	44	0.14

Sunnyvale has low TSP but high COH, indicating relatively numerous small, but few large particles; Livermore is high in both categories, and Richmond low in both categories. One may hopefully anticipate a Federal standard which better defines the real particulate problem.

One particulate species of particular concern has been lead. The District's annual average lead concentration has fallen from $1.30 \mu\text{g}/\text{m}^3$ in 1970 to $0.70 \mu\text{g}/\text{m}^3$ in 1975 or a decrease of 40%. The switch to non-leaded gasoline is primarily responsible for this improvement.

This decrease in lead values is not closely reflected in total particulate values, which have varied widely from year to year and station to station although an overall downward trend has been noted. Construction activities near a station tend to raise its TSP annual geometric mean for that year. Pittsburg, for example, had a TSP mean of 41 in 1972, 65 in 1973 and 50 in 1974, impacted by major construction in 1973.



1975 Annual Number of Days with Carbon Monoxide Exceeding Federal Standard (9 parts per million for 8 hours).

Figure 3

Carbon Monoxide

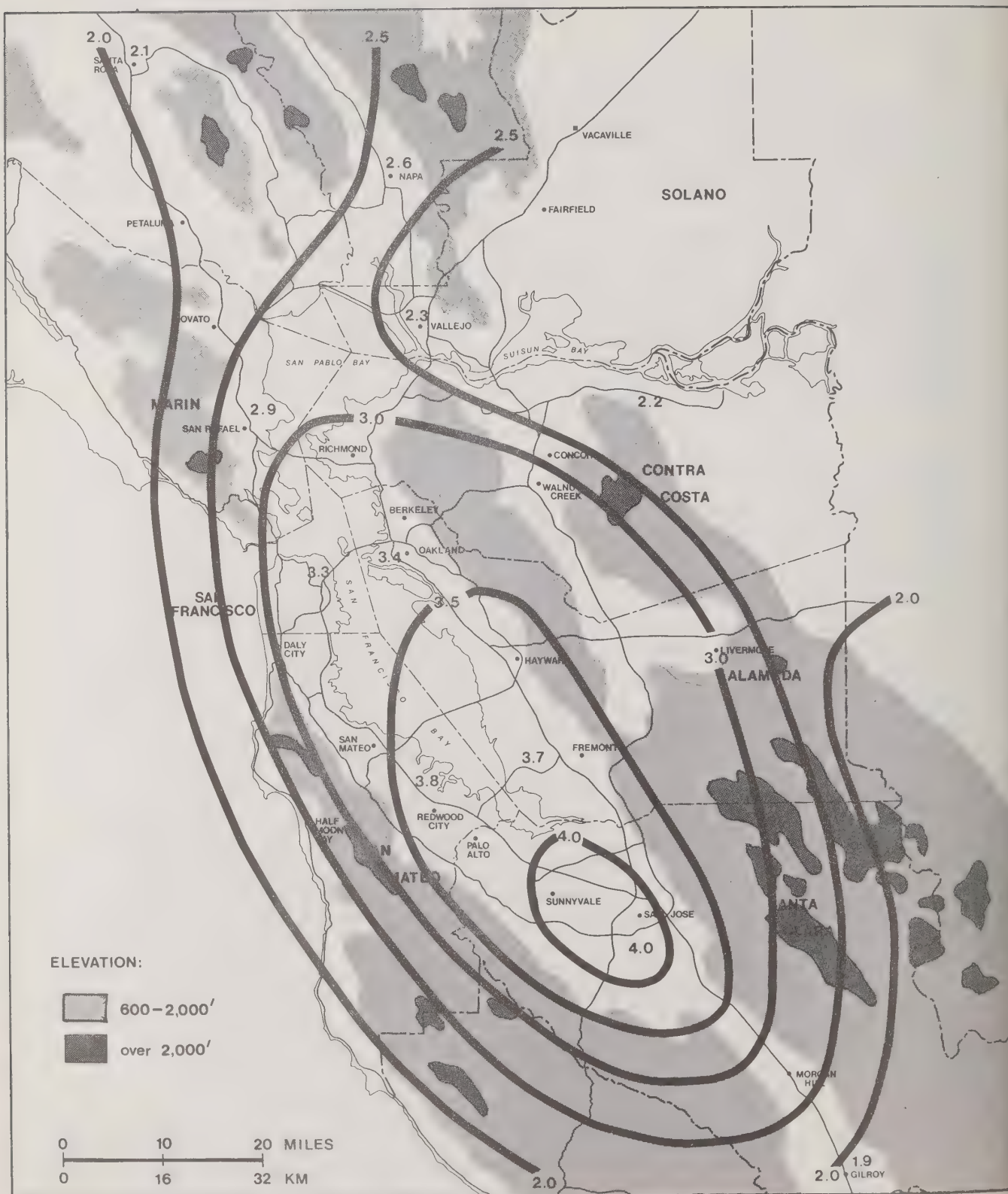
Maps of annual average values as drawn for the previous pollutants are of little value for carbon monoxide (CO) since over 90% of the CO is emitted from vehicular sources resulting in a complex latticed pattern corresponding closely to highway networks. These tail-pipe level emissions are also particularly sensitive to low-level radiation inversions, resulting in very strong daily and seasonal cyclic variations.

Despite the large tonnage of CO emissions, the Federal and State one-hour CO standards have not been exceeded in the current decade. However, the Federal 8-hour average standard of 9 ppm has been frequently exceeded in some areas. The accompanying CO map shows the number of days in 1975 with such excesses. The major excess area is the Santa Clara Valley, centered on San Jose and extending to Sunnyvale. There is a small secondary maximum over Vallejo, and isolated urban-center cases at San Francisco, Oakland, and San Rafael.

To explain this peculiar pattern, one must examine the seasonal and daily cycles in the data. In the past 6 years there has been no CO excess from March through August. Over 80% occur in November, December, and January. On a daily basis over 90% of these 8-hour excesses occur between 4 p.m. and 2 a.m. There is an intense but short maximum from 7 to 9 a.m., followed by low levels from 10 a.m. to 4 p.m. Then, since the winter-season formation of surface-based radiation inversions corresponds to the evening traffic maximum, the sustained build-up of high CO levels occurs. There is also a day-of-week factor, with greatest frequency of excesses on Friday, the maximum vehicle use day. Typically, the District's highest CO values are recorded near 11 p.m. on Friday nights in downtown San Jose. Hopefully, this targeting of the excesses in time and space may suggest the most precise and cost-effective control strategies.

The Santa Clara Valley on a "meso-scale" and the Vallejo station on a "micro-scale" show a strong "drainage pool" effect. That is, the light surface winds under the radiation inversion drain downslope (as water would) and collect pools of contaminants. The Vallejo station appears to be in such a micro-scale pool impacted by Interstate 80. This effect may have implications for land use planning and highway design.

The District average CO data have shown an 11% decrease from 1970 to 1975. Measured ambient CO levels have decreased less rapidly than total emission, apparently because the ambient values in this air basin are most sensitive to winter evening driving modes and patterns.



1975 Annual Average Nitrogen Dioxide Values in parts per hundred million (pphm). Federal standard is 5.0 pphm.

Figure 4

Nitrogen Dioxide

The map of annual average nitrogen dioxide values has the most straightforward pattern of any contaminant, showing a large maximum centered over the Santa Clara Valley. The only Federal NO₂ standard is for the annual average with a limit of 5.0 ppm. The District has never exceeded this Federal NO₂ standard, but San Jose and Sunnyvale are within 80% of it, while Santa Rosa and Gilroy at the lower bounds are near 40% of it.

Nitrogen dioxide is most important as a factor in the photochemical smog formation cycle, but is also a major factor in the dirty brown discoloration of the air. A State one-hour standard of 25 ppm has also been established (near the discoloration level). In 1975 this State standard was exceeded only once, at the Fremont station.

Since the full activation of the District's NO₂ monitoring program in 1968, the District-wide annual average has decreased 11%, but here an examination of individual stations is more elucidating. San Francisco has fallen from 4.0 to 3.3 ppm for a decrease of 18%, but San Jose has risen 3.8 to 4.0 ppm, for an increase of 5%.

The NO₂ develops in the atmosphere from nitric oxide (NO), a primary emission from motor vehicles. An examination of the NO changes helps to explain the NO₂ changes. From 1968 to 1975 the annual NO averages at San Francisco have decreased 49%, while those at San Jose have increased 20%. The Santa Clara Valley now appears to be the principal source area for this contaminant, rather than a receptor area as was more nearly true a decade ago. Independent data of total vehicle-miles by county tend to confirm the current primacy of Santa Clara County.

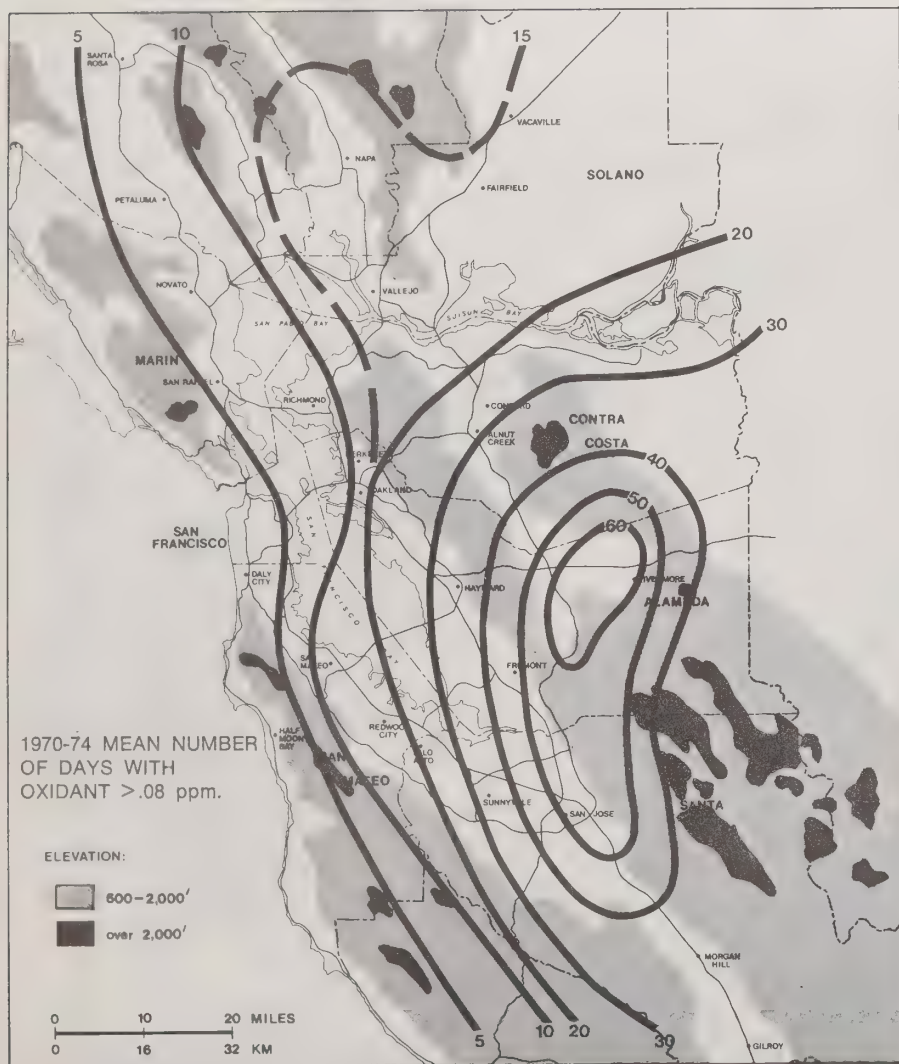


Figure 5a

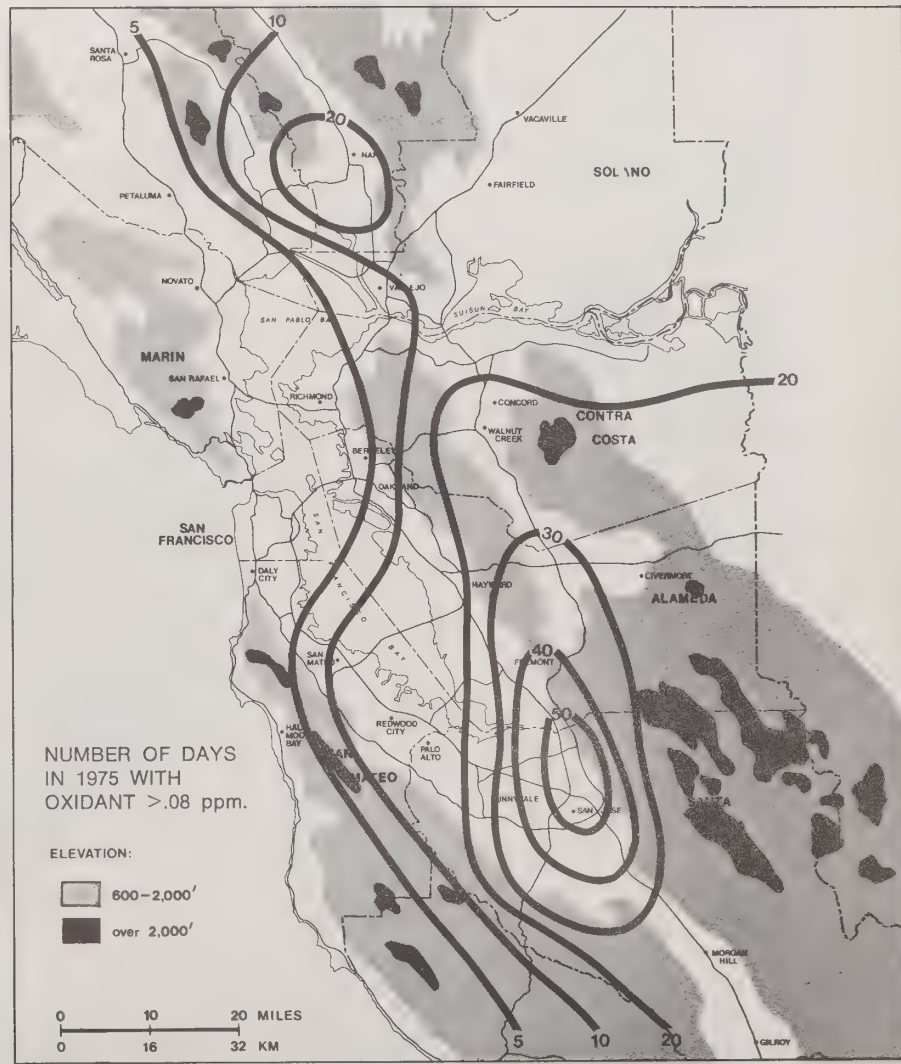


Figure 5b

Photochemical Oxidants

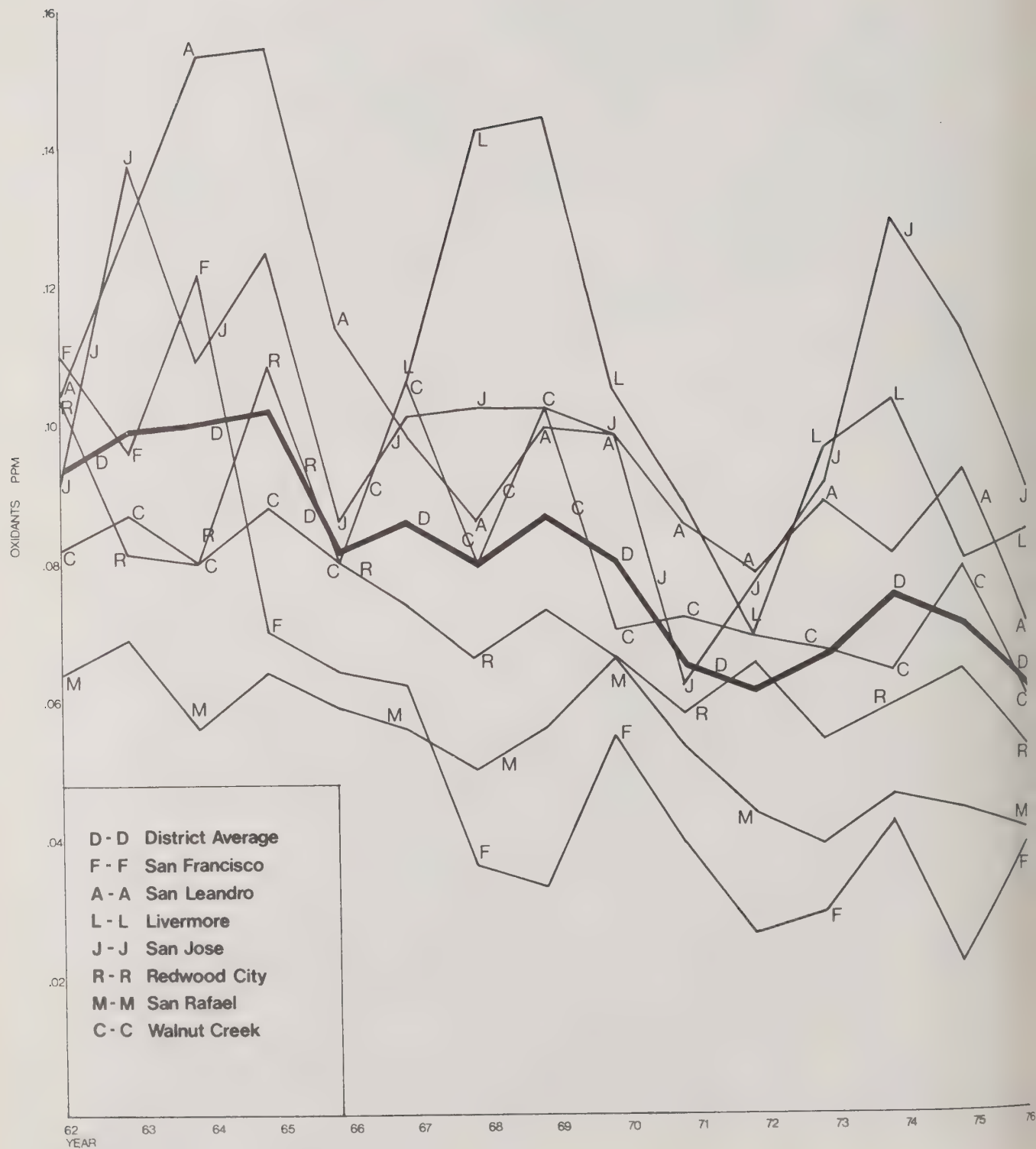
Photochemical oxidant, as the contaminant of initial and deepest concern in California has now been continuously monitored for 15 years by the BAAPCD. After peaking in 1965, the oxidant levels have shown a clear downward trend for the past 11 years, despite large annual weather-induced fluctuations. Days exceeding the Federal one-hour standard of .08 ppm averaged 131 in the 1965-69 five year period (pentad) and 85 in the 1970-74 pentad. For the 1975 base year there were 69 days over standard, and preliminary totals for 1976 show 65 days. Despite more than 50% improvement over the past decade, oxidant remains the largest and least tractable problem in terms of air quality maintenance.

For oxidant the accompanying maps plot the number of days over standard in 1975, and for comparison the average values in the 1970-74 pentad. Both maps show minimum excesses (0 to 5 days) along the coast, but in 1975 the clean band had widened and extended further inland. Maximums in both cases are over the inland sheltered valleys, but there are two significant differences. First, the 1975 intensity of the maximum is 20% lower, decreasing from 60 days to 50 days. (Preliminary 1976 data indicates a further weakening of this maximum to less than 35 days). Second, the center of the maximum has shifted from the Livermore Valley to the East Santa Clara Valley. (Preliminary 1976 data show the center remaining as in 1975, but extending more toward Gilroy than toward Livermore.)

Since the formation of oxidant is highly weather-dependent, the District has developed a "trend study" technique to damp out the primary weather factors (temperature and inversion height) and compare the oxidant levels only for days when these conditions favor its formation. Results of this study (updated to include 1976) are shown in the final graph. On oxidant-conducive days, the District average (for our 7 long-term stations) peaked at .10 ppm in 1965 and has fallen to .06 ppm in 1976. In 1971 this average fell below the Federal standard and has remained below it every since. The two long-term stations with averages remaining over standard are San Jose and Livermore.

The southeastward migration of highest values over the years is another noteworthy feature of the oxidant trend graph. San Leandro led (with over .15 ppm) in 1964 and 1965; Livermore led (with over .14 ppm) in 1968 and 1969; San Jose led (with .11 to .13 ppm) in 1974 and 1975. These highest station averages have fortunately decreased at nearly the same rate as the overall District average. The reasons for the shift appear quite complex--related to the 15-year shifts in population and vehicle use, and to the changes in emission mix and emission patterns. Additionally, the increases in emissions of primary contaminants have been into the sheltered valleys topographically and meteorologically least favorable for mixing and dispersion.

Figure 6



Trend of Average High-Hour Oxidant Concentrations For Days With Comparable Temperature & Inversion Conditions (April through October Photochemical Oxidant Seasons 1962-1976)

Air Quality Summary

The previous figures have shown graphically how air pollution is distributed throughout the region. Table 4 presents in tabular form by individual monitoring station what air quality was like in 1976. Violations of Federal or State standards are shown, as well as maximum concentration levels experienced for the year.

Table 4. AIR POLLUTION IN THE BAY AREA BY STATION AND CONTAMINANT: 1976

For oxidant and for nitrogen dioxide, "max" is the highest hourly average value expressed in parts per hundred million. For carbon monoxide, "max" is highest 8-hour average value in parts per million. (The one-hour standard for CO was never exceeded during the year.) For sulfur dioxide, "max" is highest 24-hour average value expressed in parts per million. For total suspended particulates (TSP), "mean" is annual geometric mean in micrograms per cubic meter.

Stations	OXIDANT			CO		NO ₂		SO ₂		TSP	
	Max	*	M**	Max.	*	Max.	*	Max.	+	Mean	+
San Francisco	13	2	3	11.0	4	25	1	.053	1.8	55	9.3
San Rafael	12	5	8	15.5	7	13	0	.015	0.0	36	6.4
Richmond	13	7	9	6.8	0	23	0	.013	0.0	48	12.0
Pittsburg	15	29	22	5.5	0	19	0	.015	0.0	61	16.0
Concord	17	24	—	7.4	0	23	0	.030	0.0	51	12.8
Walnut Creek	14	10	28	—	—	—	—	—	—	—	—
Oakland	15	6	7	10.5	7	—	—	—	—	—	—
San Leandro	16	9	23	—	—	—	—	—	—	—	—
Hayward	18	30	—	—	—	—	—	—	—	—	—
Fremont	16	21	39	9.8	1	28	2	.011	0.0	62	18.1
Livermore	17	29	60	7.1	0	18	0	.005	0.0	85	41.3
Alum Rock	16	31	—	—	—	—	—	—	—	—	—
San Jose	17	32	40	20.2	61	28	3	.015	0.0	71	20.8
Gilroy	21	30	—	6.8	0	23	0	.011	0.0	62	11.7
Los Gatos	14	19	32	—	—	—	—	—	—	—	—
Sunnyvale	15	22	—	12.8	14	30	4	.008	0.0	50	8.6
Mountain View	14	11	12	—	—	—	—	—	—	—	—
Redwood City	17	16	15	10.2	10	21	0	.007	0.0	59	13.0
Burlingame	15	3	10	9.5	1	22	0	.018	0.0	49	7.0
Petaluma	9	5	6	—	—	—	—	—	—	—	—
Santa Rosa	9	1	—	9.5	1	15	0	.004	0.0	66	8.6
Sonoma	13	21	—	—	—	—	—	—	—	—	—
Napa	12	16	16	10.8	2	11	0	.009	0.0	65	11.8
Vallejo	18	21	16	18.0	40	14	0	.014	0.0	52	10.2
Fairfield	14	17	16	—	—	—	—	—	—	—	—
Crockett	—	—	—	—	—	—	—	.026	0.0	—	—
Martinez	—	—	—	—	—	—	—	.020	0.0	—	—

* Number of days ambient air quality standard was exceeded. (Federal oxidant standard >8 ppm.)

** For comparison, average number of days oxidant standard was exceeded in 1970-1974 mean.

† Percent of observed days when State air quality standard was exceeded.

Source: Bay Area Air Pollution Control District, 1977

PRESENT AND PROJECTED EMISSIONS

This section presents a summary of present and projected emissions of five major air contaminants for the San Francisco Bay Region. The purpose of the emissions inventory is to identify each significant source of pollutants contributing to the air quality problems of the region. In some cases, it is possible to identify a single category of sources as being the major contributor to a given problem (e.g., carbon monoxide from motor vehicles or sulfur dioxide from fuel combustion in industrial and utility boilers). In other cases such as for photochemical oxidant, no single category of sources can be identified as the root of the problem. By identifying the most significant sources in each case, the emissions inventory provides direction for efforts to control emissions and minimize the problems they cause. Thus, the inventory is a crucial prerequisite to the development of any plan to improve air quality.

In order to develop a long range plan to improve air quality, it is necessary to know not only what current emission levels are, but what future emission levels will be. As described in the AQMP/Tech Memo 2 (December 1976), estimates of current emissions from each category of sources are combined with estimates of the rate of growth in each case and the expected effects of control programs which are in effect now, or adopted and scheduled for implementation. The one exception to this is the Bay Area Air Pollution Control District's New Source Review rule, which is not included in the emission projections. This is necessary so that the effectiveness of New Source Review as well as alternative New Source Review rules can be evaluated equally with other control programs. The projected emissions thus reflect normal growth trends.

Summary of the Emissions Inventory

Emission inventories have been compiled for 1975, 1985, and the year 2000, and are summarized in Tables 5, 6, and 7. They are also shown in graphic form in Figures 7 through 11. Estimates of stationary sources and aircraft emissions were made by the Bay Area Air Pollution Control District while motor vehicle emissions estimates were made through the joint efforts of the Association of Bay Area Governments, Metropolitan Transportation Commission and California Air Resources Board.

For hydrocarbons, the most significant source categories are organic compounds evaporation (otherwise known as organic solvents) and both light and heavy duty motor vehicles. Each of these source categories have previously been the target of control efforts, and it is evident that further controls will be necessary if significant air quality improvement is to be made. Total hydrocarbon emissions are projected to decrease somewhat by 1985 due to the implementation of controls now on the books, but to rise back to the 1975 level by the year 2000.

For oxides of nitrogen, the principal source categories are stationary source fuel combustion, and light and heavy duty motor vehicles. Efforts to control motor vehicle NO_x emissions have been controversial in recent years while stationary source NO_x control has been limited to only the largest sources. The problem in pursuing NO_x control is

that NO_x alone is not a problem in the Bay Area. It is a contributor to the photochemical oxidant problem in the region, but its precise role has not been well defined to date. NO_x emissions are projected to remain at a relatively constant level over the 25 year planning time frame. By 1985, the expected increase in stationary source NO_x emissions due to increased use of fuel oil will be offset by additional motor vehicle NO_x control. By 2000, increasing usage of nuclear fuels for electric power has been assumed to offset increased NO_x emissions in other source categories.

In the case of carbon monoxide, light and heavy duty motor vehicles are by far the most significant sources. Unlike hydrocarbon and NO_x emissions, CO emissions are projected to be substantially greater in the year 2000 than they are in 1975. The principal causes are the overall growth in vehicle activity over the 25 year period, and the expected deterioration of current vehicle emission control devices.

Sulfur dioxide emissions are due primarily to stationary source fuel combustion, and petroleum refining and chemical operations. A substantial increase in SO₂ emissions is projected to occur by 1985, due primarily to the progressively limited supplies of natural gas and the expected switch to fuel oil and coal for combustion processes. SO₂ emissions decrease slightly by the year 2000 due to an assumed switch of a portion of PG&E's electric power generating capacity to nuclear plants.

Finally, emissions of suspended particulate matter are produced from many diverse sources, with no single source or sources contributing a large share. Emissions for this pollutant are projected to increase steadily between 1975 and 2000. A significant unknown is the contributions to particulates from windblown dust and secondary organics (photochemical aerosol). Until these unknowns are better defined, it will be difficult to properly interpret the emission inventory for particulates.

Figures 12-14 provide a more detailed breakdown of certain large emission categories. Figure 12 divides motor vehicle emissions into the major vehicle categories. Figure 13 and 14 detail the organic solvent and combustion emissions by source type for 1985.

TABLE 5. 1975 EMISSIONS BY MAJOR SOURCE CATEGORY

MAJOR SOURCE CATEGORY	EMISSIONS (TONS/DAY)				
	HC	NO _x	CO	SO ₂	Part.
Petroleum Refining	25.2	5.9	-	39.0	2.5
Chemical	5.5	3.1	37.3	84.6	4.9
Other Industrial/Commercial	10.2	2.5	21.7	5.9	75.3
Petroleum Refinery Evaporation	46.0	-	-	-	-
Gasoline Distribution	60.4	-	-	-	-
Other Organic Compounds Evaporation (Organic Solvents)	311.1	-	-	-	-
Combustion of Fuels	8.1	196.0	17.5	43.7	16.3
Burning of Materials	19.8	1.4	58.2	0.3	12.9
Off-Highway Mobile Sources	45.0	59.4	277.7	25.8	5.2
Aircraft	19.6	13.5	54.5	1.3	9.0
Light-duty Automobiles	340.1	231.7	2,357.0	7.4	27.8
Other Motor Vehicles	<u>132.2</u>	<u>167.8</u>	<u>1,507.0</u>	<u>11.3</u>	<u>15.2</u>
TOTAL (TONS/DAY)	1,023	731	4,331	219	169

TABLE 6. 1985 EMISSIONS BY MAJOR SOURCE CATEGORY

MAJOR SOURCE CATEGORY	EMISSIONS (TONS/DAY)				
	HC	NO _x	CO	SO ₂	Part.
Petroleum Refining	41.0	15.2	-	67.5	4.4
Chemical	5.6	2.9	37.5	89.1	5.2
Other Industrial/Commercial	11.1	2.7	24.0	6.5	80.8
Petroleum Refinery Evaporation	50.0	-	-	-	-
Gasoline Distribution	27.1	-	-	-	-
Other Organic Compounds Evaporation (Organic Solvents)	344.8	-	-	-	-
Combustion of Fuels	11.5	321.1	21.3	213.9	34.5
Burning of Materials	22.2	1.5	62.7	0.3	13.9
Off-Highway Mobile Sources	50.3	73.7	322.6	30.9	6.3
Aircraft	20.2	19.6	69.9	1.6	11.4
Light-duty Automobiles	117	89.3	1,768.7	9.7	18.8
Other Motor Vehicles	96	165.8	1,699.3	15.0	16.3
TOTAL (TONS/DAY)	797	692	4,006	435	192

TABLE 7. 2000 EMISSIONS BY MAJOR SOURCE CATEGORY

MAJOR SOURCE CATEGORY	EMISSIONS (TONS/DAY)				
	HC	NO _x	CO	SO ₂	Part.
Petroleum Refining	55.4	20.0	-	88.9	5.8
Chemical	6.	3.9	37.5	119.8	6.1
Other Industrial/Commercial	12.7	3.1	24.0	7.4	90.5
Petroleum Refinery Evaporation	52.1	-	-	-	-
Gasoline Distribution	28.2	-	-	-	-
Other Organic Compounds Evaporation (Organic Solvents)	493.4	-	-	-	-
Combustion of Fuels	15.0	279.8	25.7	129.9	30.7
Burning of Materials	23.6	1.7	69.7	0.4	22.5
Off-Highway Mobile Sources	75.4	94.1	389.3	31.1	7.8
Aircraft	27.8	32.7	106.3	2.5	19.4
Light-duty Automobiles	160.6	77.1	2,505.0	13.2	22.3
Other Motor Vehicles	107.1	208.4	2,505.0	20.4	19.8
TOTAL (TONS/DAY)	1,058	721	5,663	414	225

Figure-7

HYDROCARBON EMISSION TRENDS

SAN FRANCISCO BAY REGION

TONS/DAY

SOURCE CATEGORY:

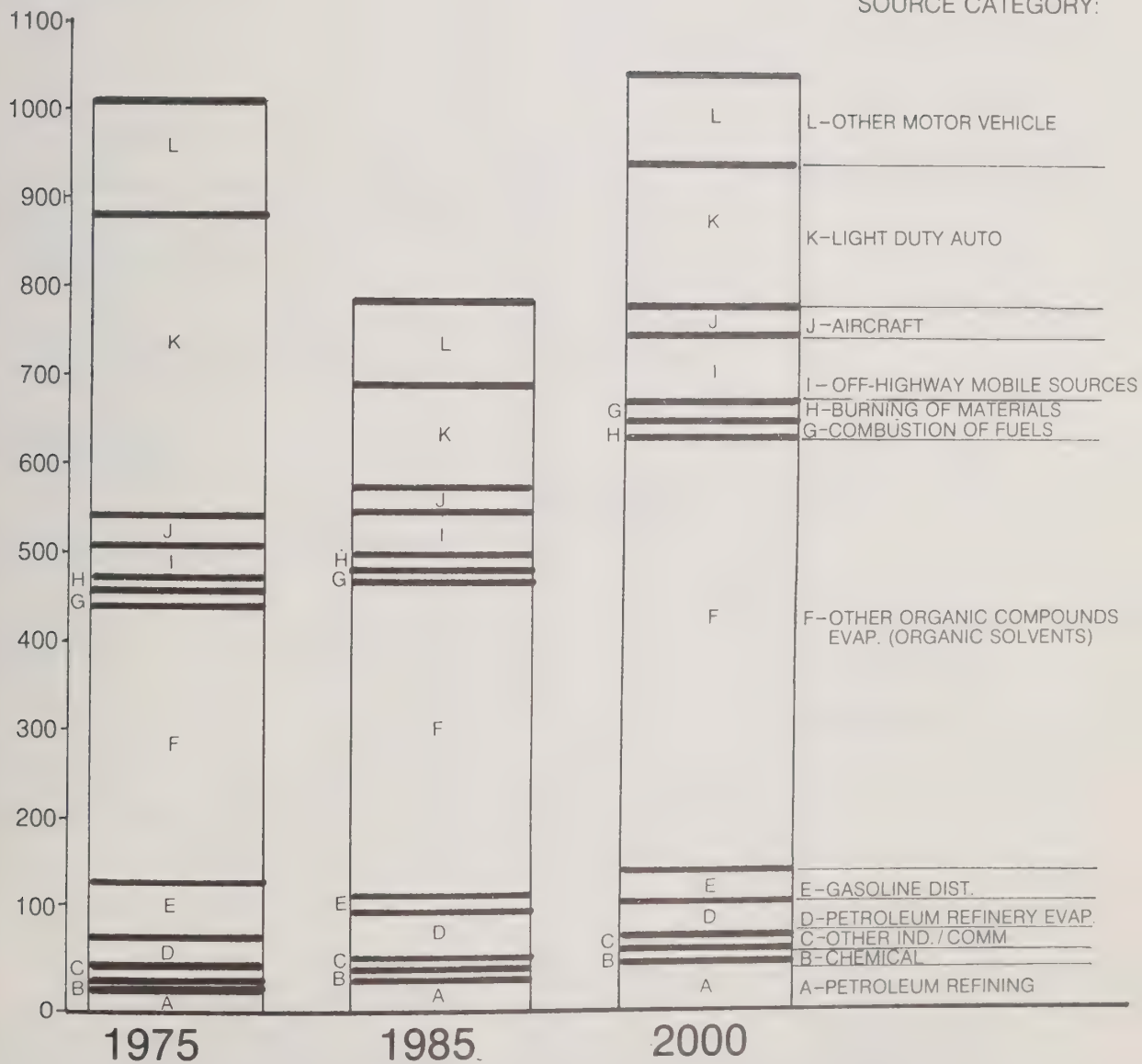


Figure- 8

NITROGEN OXIDES EMISSION TRENDS

SAN FRANCISCO BAY REGION

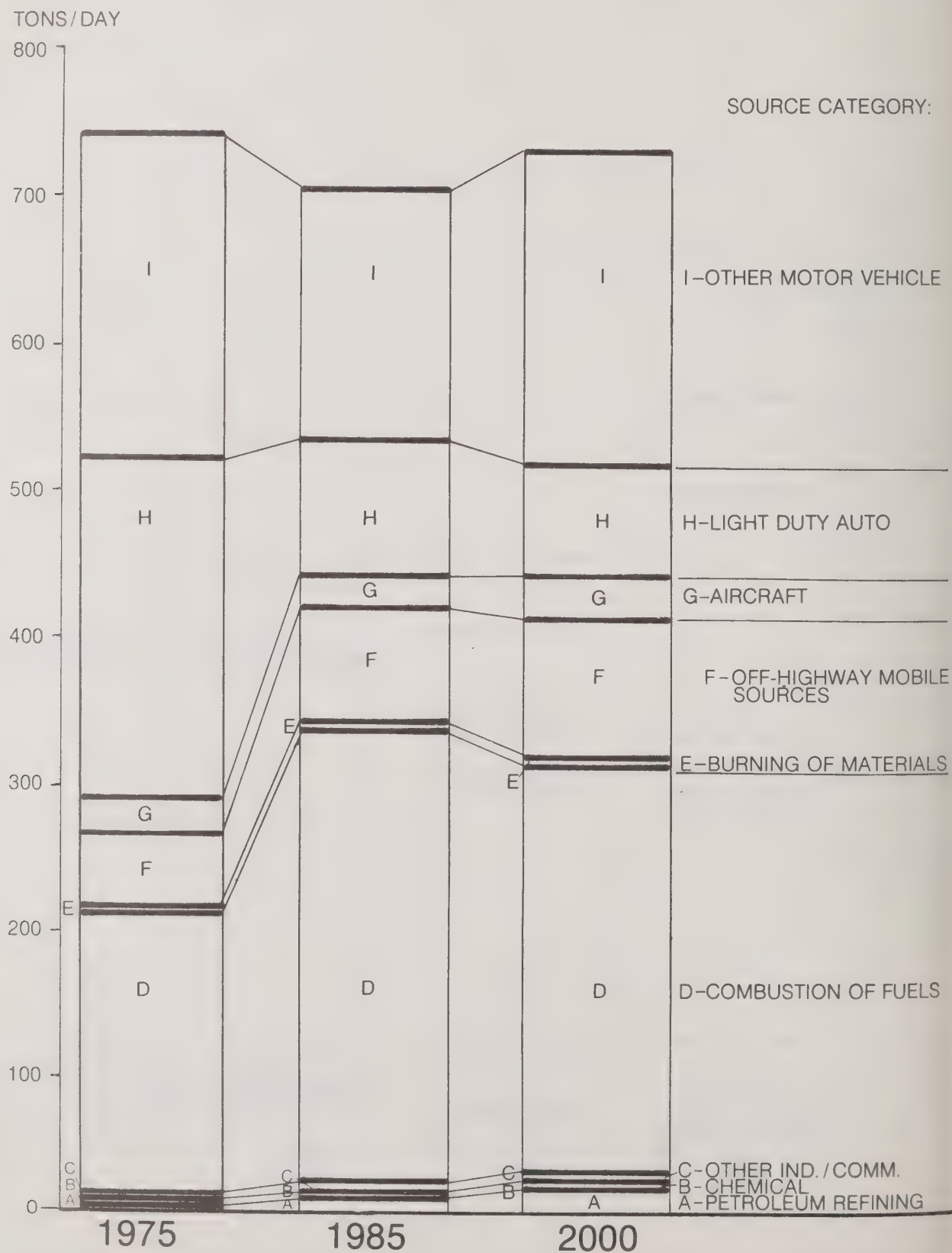


Figure-9

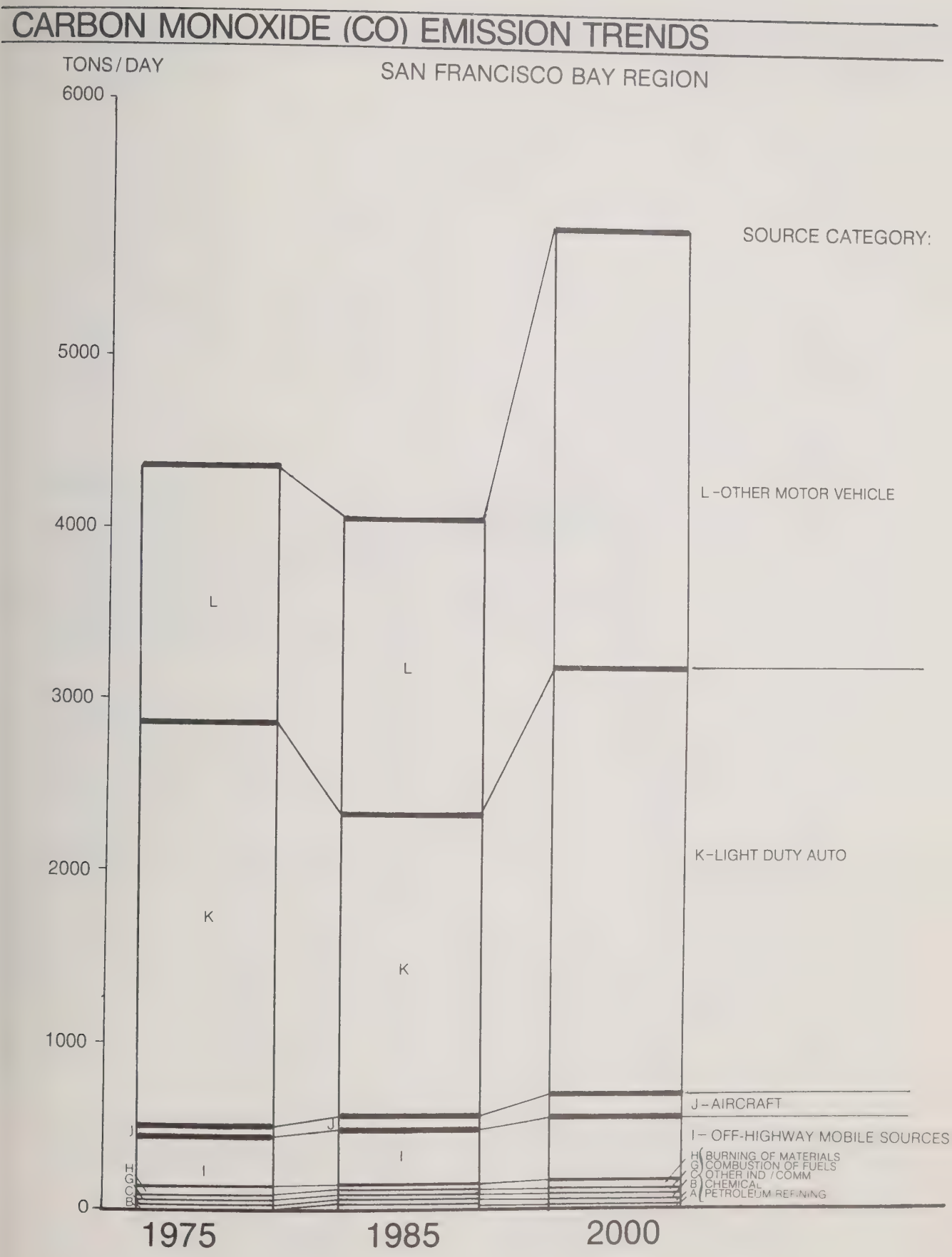


Figure -10

SULFUR DIOXIDE EMISSION TRENDS

SAN FRANCISCO BAY REGION

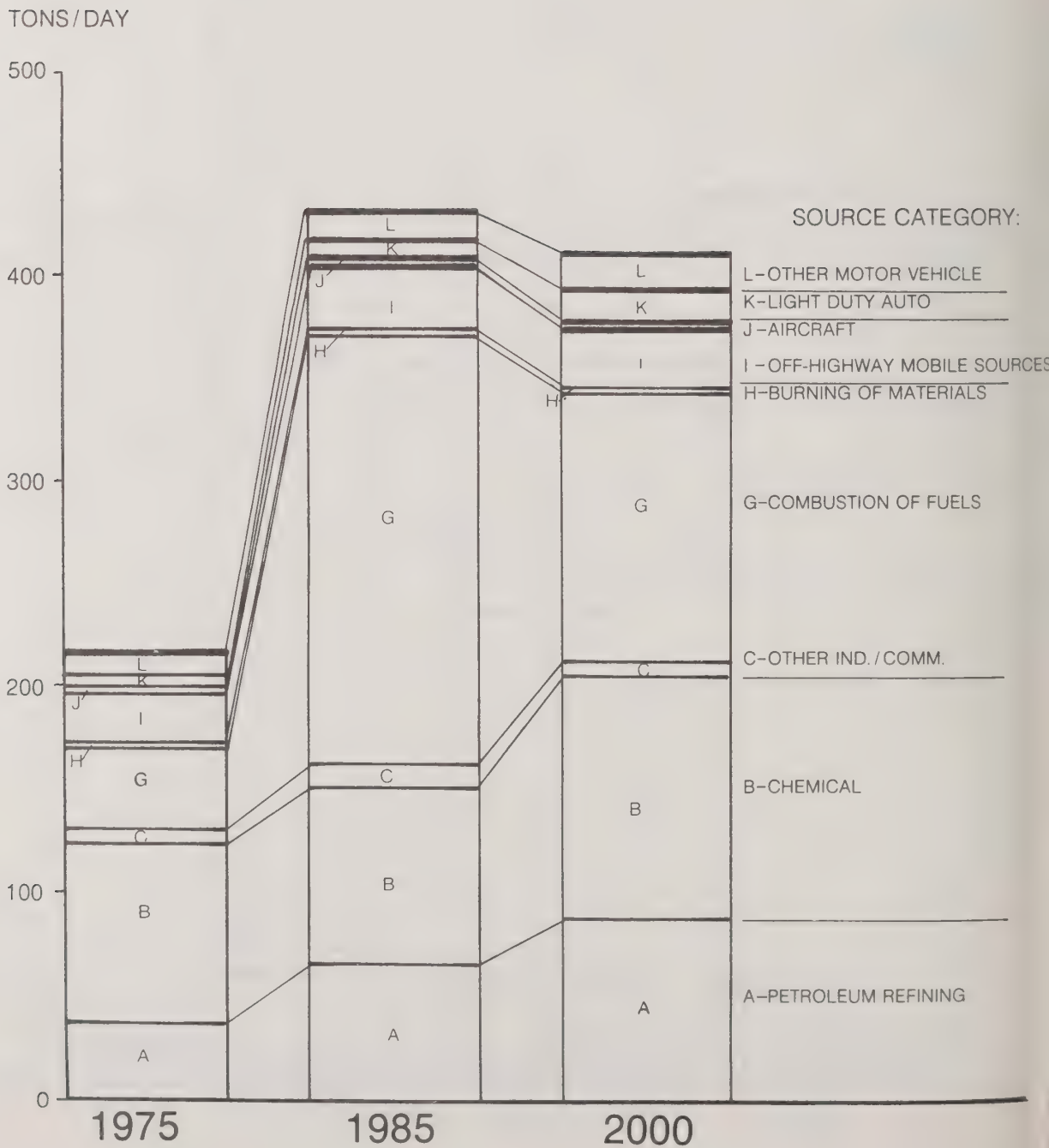


Figure - 11

PARTICULATES EMISSION TRENDS

SAN FRANCISCO BAY REGION

TONS/DAY

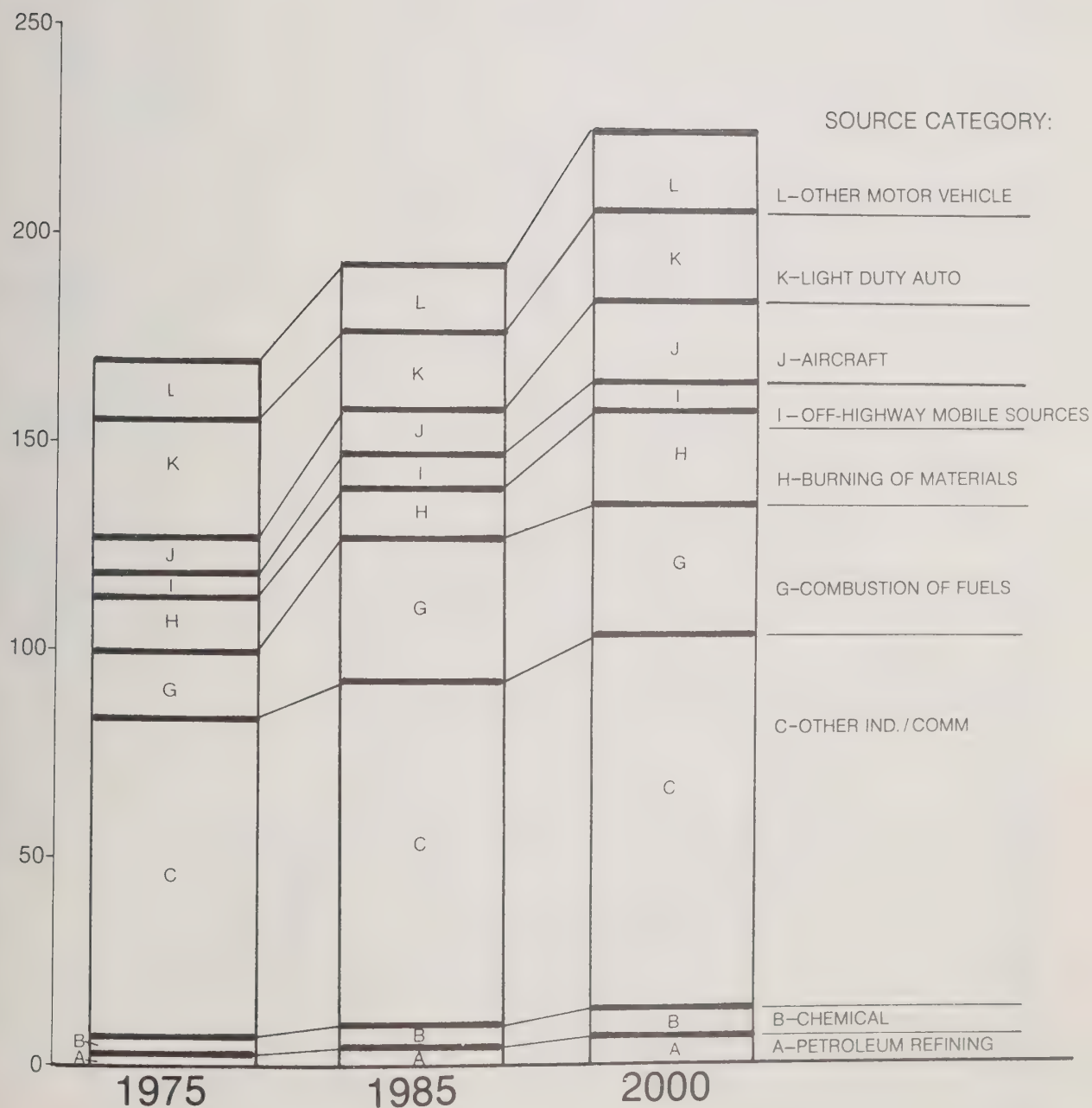


Figure-12

MOTOR VEHICLE EMISSIONS (1985)



Figure 13

BREAKDOWN OF ORGANIC SOLVENT EMISSIONS BY SOURCE TYPE IN 1985

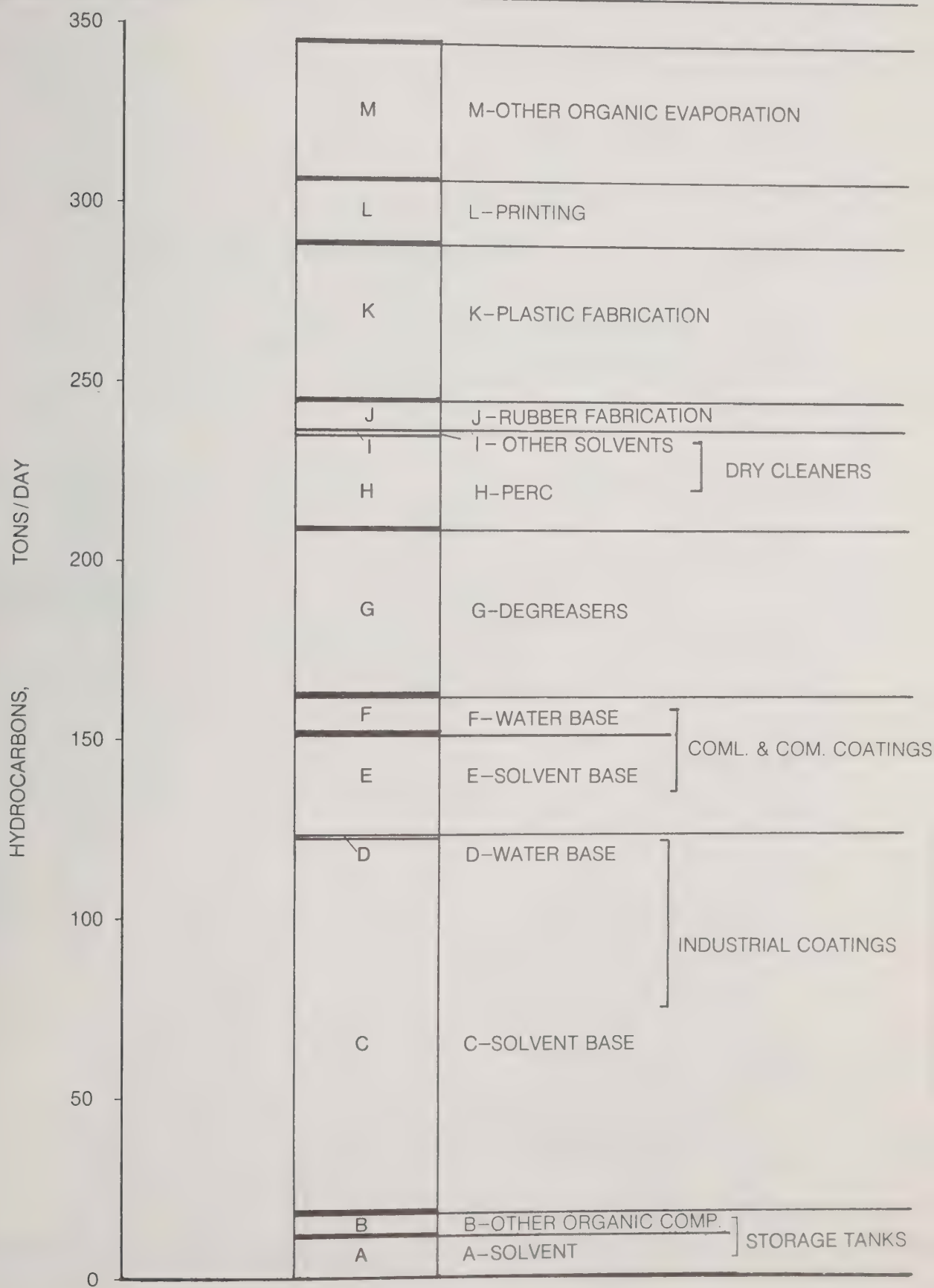
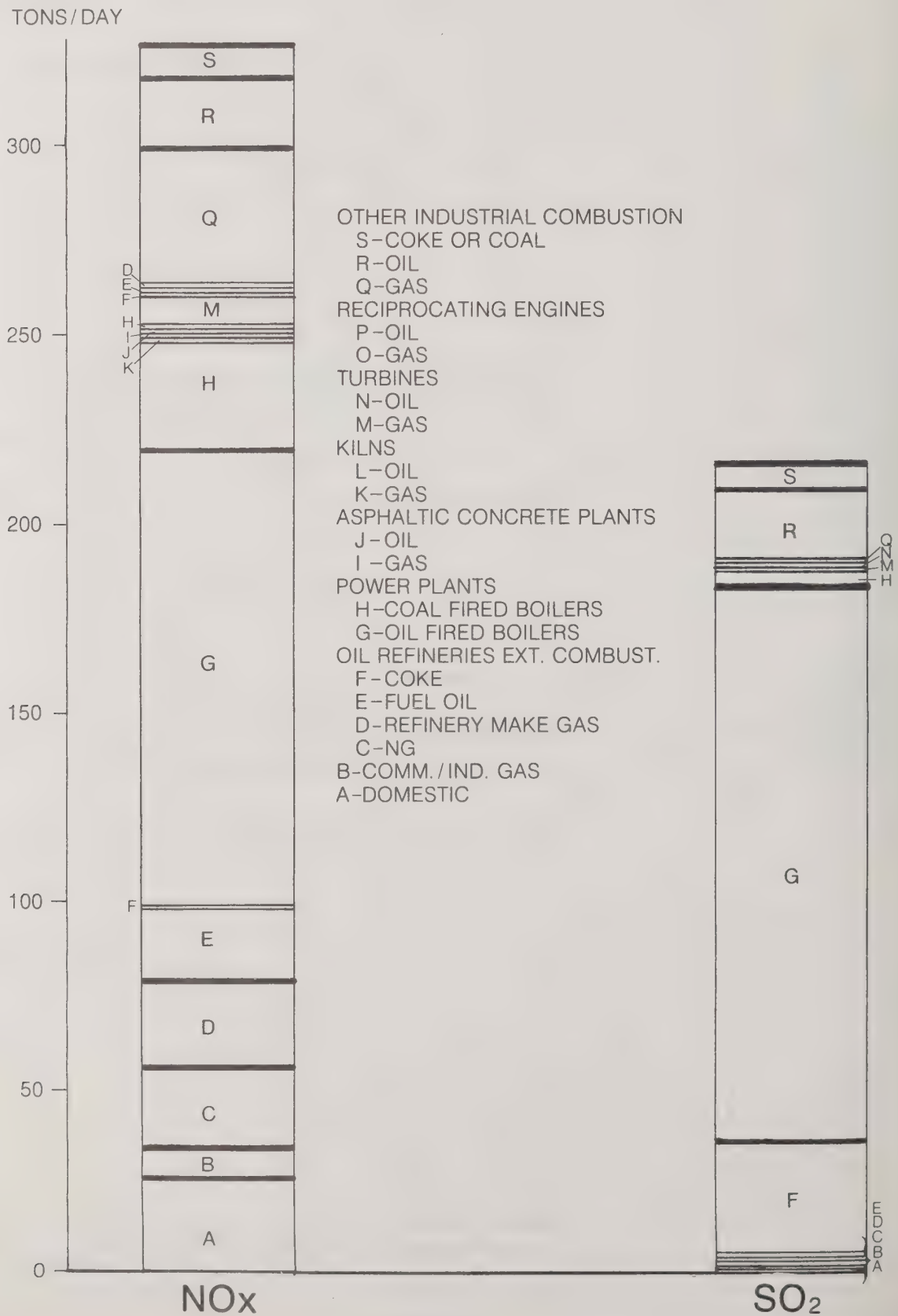


Figure - 14

BREAKDOWN OF FUEL COMBUSTION EMISSIONS BY
SOURCE TYPE IN 1985



AIR QUALITY TRENDS

Based on historical air monitoring data, the emission inventory projections, and air quality models, it is possible to forecast air quality trends. These trends project future air quality assuming no additional controls beyond those in place or scheduled.

- Sulfur dioxide - Sulfur dioxide emissions are projected to double by 1985, due primarily to the expected switch from natural gas to fuel oil and coal in electric utility and industrial boilers. Consequently, it is expected that SO₂ levels will increase substantially. The increased emissions are not projected to result in violations of the Federal standards. Recently, California revised its standards for SO₂. This revision complicates the assessment of the impact of emission increases on compliance with the SO₂ standard because it is now dependent on oxidant and particulate levels. Neither historical data bases nor available modeling techniques are ready to address the new standard at this time. A more detailed assessment of the State SO₂ problems projected is recommended for the continuing planning process.
- Total suspended particulates - Emissions of particulate matter are projected to increase steadily from 1975 to 2000. As previously described, both Federal and State standards for particulates are violated in the region by a small margin. The significance of the increased emissions with respect to future violations cannot be assessed with existing data. The two largest components of particulate matter in the Bay Area's atmosphere are organic matter and dust. The development of a control strategy must await the collection of more refined data to identify the nature and sources of particulates in the air. The research work to obtain this data is recommended for the continuing planning process.
- Carbon monoxide - By far the dominant source of carbon monoxide emissions is motor vehicles. By 1985, a modest improvement of about ten percent will occur due to State and Federal motor vehicle control programs. By 2000, however, a substantial increase in CO levels beyond those experienced in 1975 will occur. The number of vehicles and the number of miles driven in the region are projected to increase by about 70 percent between 1975 and 2000. It appears the emission control technologies currently used for automobiles and trucks may not be sufficient to prevent continuing violations of the CO standard in the Bay Area. When this AQMP program was initiated, the established CO emission factor was 9.0 grams/mile for light duty vehicles. The projections shown in Figure 9 have assumed this factor. More recently, the 1977 Clean Air Act and discussions with the CARB reveal that a more stringent emission factor will ultimately be adopted. As these changes are finalized, the inventory will have to be updated to reflect the changes. CO problems are localized and occur in relatively few areas of the region. Solutions to these problems require a case by case analysis of the causes of the problems. The current AQMP effort has not conducted any detailed CO studies at a local level. These are recommended as part of the continuing planning process.

- Nitrogen dioxide - The Federal standard for nitrogen dioxide is not currently violated. In addition, the emission inventory projection for NO_x does not indicate a significant increase in NO_x emissions. The conclusion is therefore that no future violations of the nitrogen dioxide Federal standard are expected. California has a 0.25 ppm-one hour average NO_2 standard. In 1976, this standard was violated several times in a few Bay Area locations. These violations are suspected to be mobile source related. If this is the case, the current CARB controls for NO_x emissions from motor vehicles may solve the NO_2 problem. The analysis of oxidant control strategies shows additional controls of NO_x emissions beyond those currently planned for will worsen the oxidant air quality in the Bay Area. Because of the counterproductive aspects of such controls, no additional NO_x controls are proposed in this plan. A summary of the critical issues facing the region about whether or not more NO_x controls are needed is presented in Section 6. Technically, this is the most controversial issue facing the Bay region.
- Photochemical Oxidants - Oxidants (primarily ozone) are formed in the atmosphere from emissions of hydrocarbons and oxides of nitrogen. From the emission inventory projections, hydrocarbon emissions are expected to decline moderately by 1985, and to rise back to the 1975 level by the year 2000. Oxides of nitrogen are projected to remain relatively constant from 1975 to 2000. These projections suggest that oxidant levels will be moderately reduced (an approximate 10 to 20 percent improvement) by 1985, but this improvement will not be maintained through the year 2000. Air quality data collected over the past several years indicate a slow trend toward lower oxidant levels and it is expected that this trend will continue for several more years. Somewhere around 1985, the trend will reverse if no further controls are implemented. Since oxidants are generally considered to be the most serious regional air quality problem, it has been analyzed extensively in this program. Most of the remaining report deals with the oxidant problem and recommended strategies for solving it.

THE LIVERMORE REGIONAL AIR QUALITY MODEL (LIRAQ)

Complex atmospheric and chemical relationships combine to determine air quality on an urban and regional basis. The use of sophisticated planning and analysis tools is necessary for developing information to guide in making decisions that will affect this air quality. The set of computer codes, which together comprise the Livermore Regional Air Quality (LIRAQ) model, have been developed as an operational tool to assist air quality planners and control agencies in tasks such as assessing the compliance of present air quality with Federal ambient air quality standards, evaluating the impact on regional air quality of various land use alternatives, and predicting the effect on regional air quality of new sources and various control strategies.

The LIRAQ model has been developed by the Lawrence Livermore Lab (LLL) with the support of the National Science Foundation (NSF) and in cooperation with the Bay Area Air Pollution Control District (BAAPCD). The BAAPCD has provided a detailed source inventory and much of the information needed to compare the numerical model predictions with observations. It is also the initial user agency. Also involved were the NASA Ames Research Center, which used its instrumented aircraft to gather data for model comparison with observation.

The LIRAQ model attempts to treat most of the important factors that determine regional air quality as a function of time. The region of initial interest, the San Francisco Bay Area, is characterized by both its complex topography and its changing meteorology. As shown in Figure 16, the region has quite intricate geographic features, including numerous ridges, hills, valleys, the Pacific Ocean, a central bay, and major inland flats. Meteorological systems formed over the Pacific Ocean are influenced by the complex Bay Area topography to create complicated, temporally and spatially varying wind fields, and inversion base heights. The model treats both the complex topography and changing meteorology on one of several available grid scales (1 km or greater) from which the user may choose to study a particular air quality problem. The model does not attempt to forecast tomorrow's air quality, because that would require the capability to forecast the regional meteorology, a formidable problem in itself. Instead, in LIRAQ, the meteorology must be specified, either at measurement stations or by coordinates. Typically, this involves use of either real or hypothetical meteorological situations (based on sets of previously acquired meteorological observations) that may be expected to be similar to future weather patterns.

The air quality region capable of being studied is based on the boundaries of the BAAPCD and encompasses all or parts of nine counties.

Within the approximate 14,000 km² of the BAAPCD, the emission of pollutants is spread in a non-uniform pattern over the region of interest. The model deals with four separate types of pollutant sources:



Figure 15. Topography of the San Francisco Bay Area

- Mobile (using emissions derived from a traffic model that represents the Bay Area traffic network using about 13,600 highway links and simulates hourly loading--compiled by ABAG, MTC, and the CARB).
- Point (based on a compilation of major point sources from the BAAPCD with an hourly emission cycle and differentiating between surface and elevated).
- Airport (treated as limited-area surface sources with estimated hourly air traffic loading).
- Area (based on a distribution of estimated emissions using data from ABAG's Series 3 projections).

The pollutant species of interest in studying the regional air quality in the Bay Area can be divided into primary and secondary species. The primary species (meaning those which have identifiable man-made sources) that the LIRAQ model can treat are carbon monoxide (CO), nitric oxide (NO), and hydrocarbons (HC). Based on the particular reaction set used in this model to treat photochemical air quality, hydrocarbons are divided into three characteristic types based on their reactivity: HC1 (mainly alkenes), HC2 (mainly alkanes, simple aromatics, ethers, alcohols, etc.), and HC4 (mainly aldehydes, some ketones, some aromatics). In addition, secondary species (those created through chemical transformation processes in the atmosphere) including ozone (O₃), nitrogen dioxide, (NO₂), and others must be and are treated by the LIRAQ model.

The LIRAQ model is capable of simulating the time- and space-varying concentrations of non-reactive and reactive pollutants on a regional basis using prescribed meteorology and source emissions. The basic types of questions that the model has been designed to deal with can be derived into three categories:

- Assessment of present air quality: By inputting to the model the present regional pattern of source emissions, the air quality on specific days can be simulated. While observations from monitoring stations do provide an indication of present air quality at a few points (observations with which the model results may be compared), the model also indicates what the air quality is at locations between such observation sites. Such results may thus point to regions where more extreme air pollutant concentrations may prevail than are being measured. Such information may then assist in locating monitoring stations or indicate where mobile measurement stations should sample.
- Development of emission control strategies: For regions which do not meet the Federal air quality standards, the development of control strategies is an important consideration. A variety of model simulations may prove useful, depending on the time and spatial scale of the problem. One application might be to

determine the relative role played by various types of sources--mobile, point, airport, and area--in degrading regional air quality. Another subject to investigate might be the relative importance of various species, as for example the importance of hydrocarbons with different reactivities. With such information, control strategies could be proposed and their effect simulated in order to determine the sense and magnitude of the effect.

- Planning for future air quality: Although control of emissions is the primary way to improve present air quality, proper planning of the locations, extent, and mix of future pollutant emissions is believed to be useful in assuring that future air quality meets appropriate standards. More specifically, the effect on air quality of a proposed source of subregional significance can be evaluated. In addition to investigating land use, planning for potential changes in fuel usage can be undertaken. For example, the potential effect of substituting fuel oil for natural gas could be simulated, assuming emission data can be specified.

The range of problems that are being addressed by air quality planners is very broad. The current AQMP effort has addressed many of the issues regarding oxidant control strategies. Many more issues still remain to be investigated. The following section and chapters describe much of the technical support analysis leading to recommendations for a comprehensive control strategy to solve the region's oxidant problem.

BASELINE PHOTOCHEMICAL OXIDANT TRENDS

Using prototype meteorological data and the emissions inventory projections previously described, photochemical oxidant forecasts were made for the Bay Area for 1985 and 2000. These results are presented in Tables 8 and 9. These projections show that regional oxidant is expected to improve between 1975 and 1985 by approximately 20%. This improvement is anticipated largely because of the Federal and California motor vehicle control programs. Between 1985 and 2000, however, due to growth in population, motor vehicles, and normal urban activities (e.g., painting, printing, dry cleaning), the oxidant is projected to deteriorate to about 1975 levels again. Figures 16-18 show LIRAQ projection results for 1975, 1985, and 2000 in the southern parts of the region.

LIRAQ is somewhat limited in the areas it can simulate during any one run. Table 8 presents results of the southern Bay areas while Table 9 presents data for the north Bay counties. The north Bay results should be viewed with caution since the prototype meteorology assumed for the analysis is not indicative of adverse meteorological conditions which have been experienced in the north Bay. The north Bay results do show, however, the trends generally predicted for the entire Bay region. Between 1975 and 1985, most north Bay areas will experience modest improvements in oxidant. This improvement will reverse itself around 1985, until oxidant levels in 2000 deteriorate back to 1975 levels.

Table 8. Bay Area Baseline LIRAQ Projections (1975-2000)

	1975	1985	2000
Location of Regionwide High Hour Ozone	9.5 Kms SSE of Livermore	9.5 Kms SSE of Livermore	9.5 Kms SSE of Livermore
Regional High Hour (ppm)	.17	.13	.17
Monitoring Station with Highest Ozone	Livermore	Livermore	Livermore
Ozone at Highest Station (ppm)	.13	.10	.13
Projected Ozone Maximum at Individual Stations (ppm)			
San Francisco	.02	.02	.02
San Rafael	.02	.02	.05
Pittsburg	.04	.03	.05
Livermore	.13	.10	.12
Fremont	.07	.05	.06
San Jose	.13	.09	.13
Redwood City	.09	.06	.07
Concord	.06	.05	.06
Richmond	.04	.03	.04
Half Moon Bay	.03	.03	.03
San Leandro	.07	.05	.06
Los Gatos	.07	.05	.07
Vallejo	.05	.04	.04

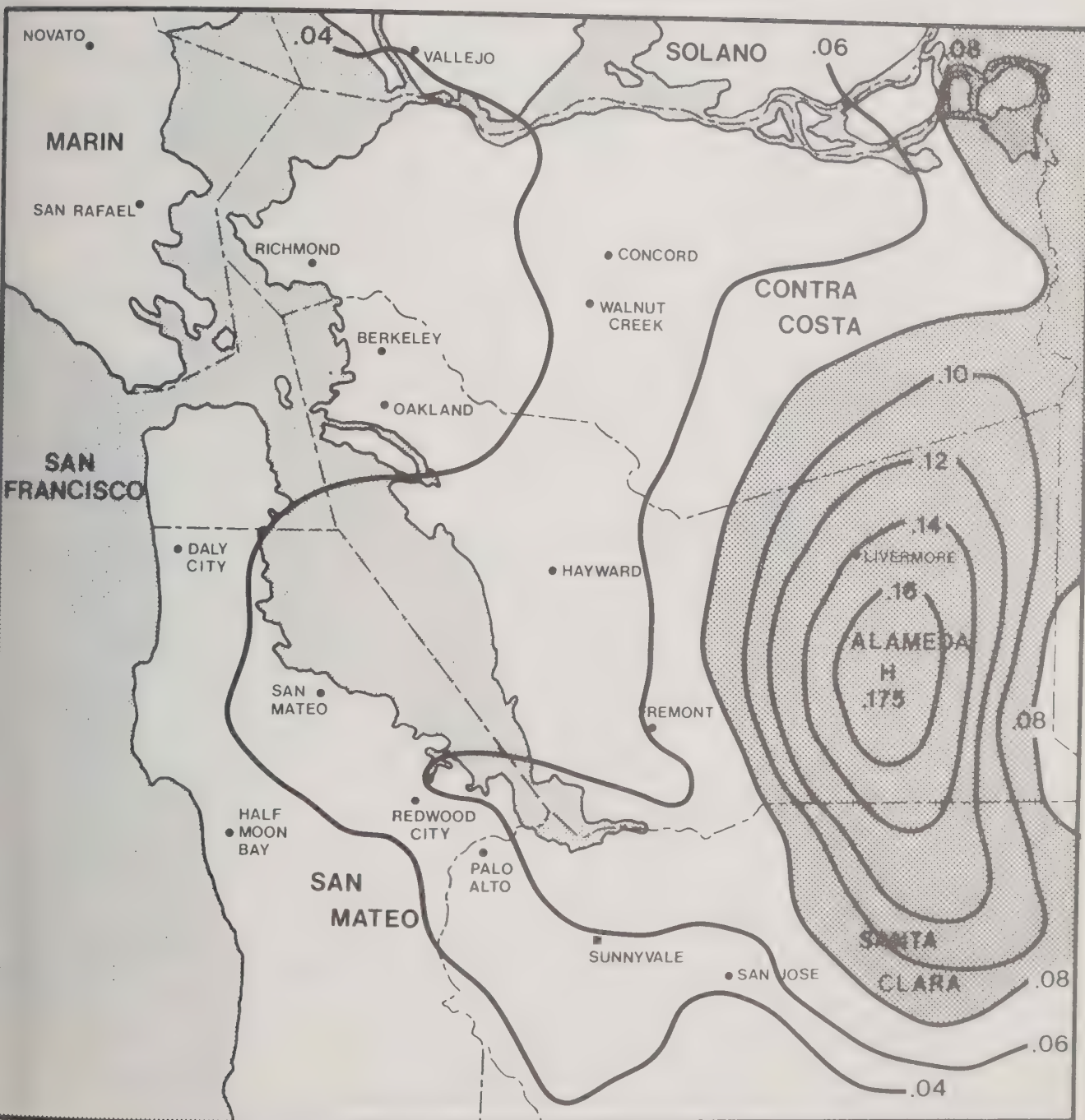
- NOTES: 1) Prototype day assumed is July 26, 1973. On this day the maximum oxidant level recorded was 0.18 ppm monitored in Livermore.
2) The Federal photochemical oxidant standard is 0.08 ppm - one hour, not to be exceeded more than once per year.
3) Projections presented are uncorrected for worst case conditions.

Table 9. Bay Area Baseline LIRAQ Projections
(North Bay) 1975-2000

	1975	1985	2000
Location of North Regional High Hour Zone	Napa Airport	12 Km. ESE Travis AFB	12 Km. ESE Travis AFB
North Regional High Hour (ppm)	.08	.07	.08
Monitoring Station with Highest Ozone	Napa Airport	Travis AFB	Napa Airport
Ozone at Highest Station (ppm)	.08	.06	.07
Projected Ozone Maximum at Individual Stations (ppm)			
San Francisco	.02	.02	.02
Santa Rosa	.04	.04	.04
San Rafael	.03	.03	.03
Petaluma	.04	.04	.04
Napa	.08	.06	.07
Sonoma County Airport	.03	.03	.07
Pittsburg	.06	.04	.05
Hamilton Air Force Base	.03	.03	.03
Napa County Airport	.08	.06	.07
Concord	.07	.05	.06
Richmond	.04	.03	.04
Travis Air Force Base	.07	.06	.07
Angel Island	.04	.03	.04
Point Bonita	.04	.03	.04
Fairfield	.06	.06	.06

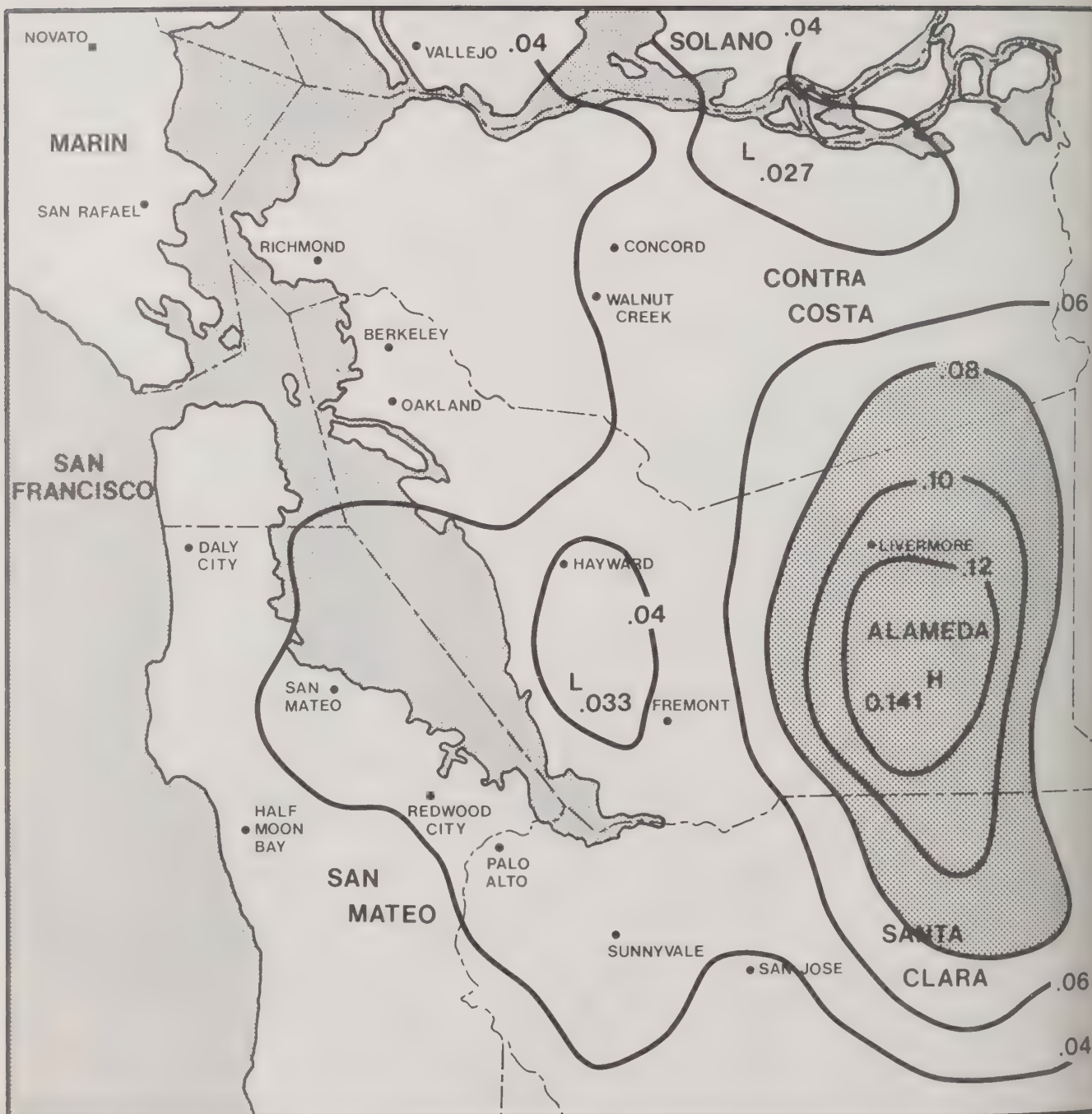
NOTES: 1) Prototype day assumed is July 26, 1973. On this day the maximum oxidant level recorded was 0.18 ppm monitored in Livermore.
2) The Federal photochemical oxidant standard is 0.08 ppm - one hour, not to be exceeded more than once per year.
3) Projections presented are uncorrected for worst case conditions.

Figure 16. Example LIRAQ Results - 1975 Baseline Ozone Projections



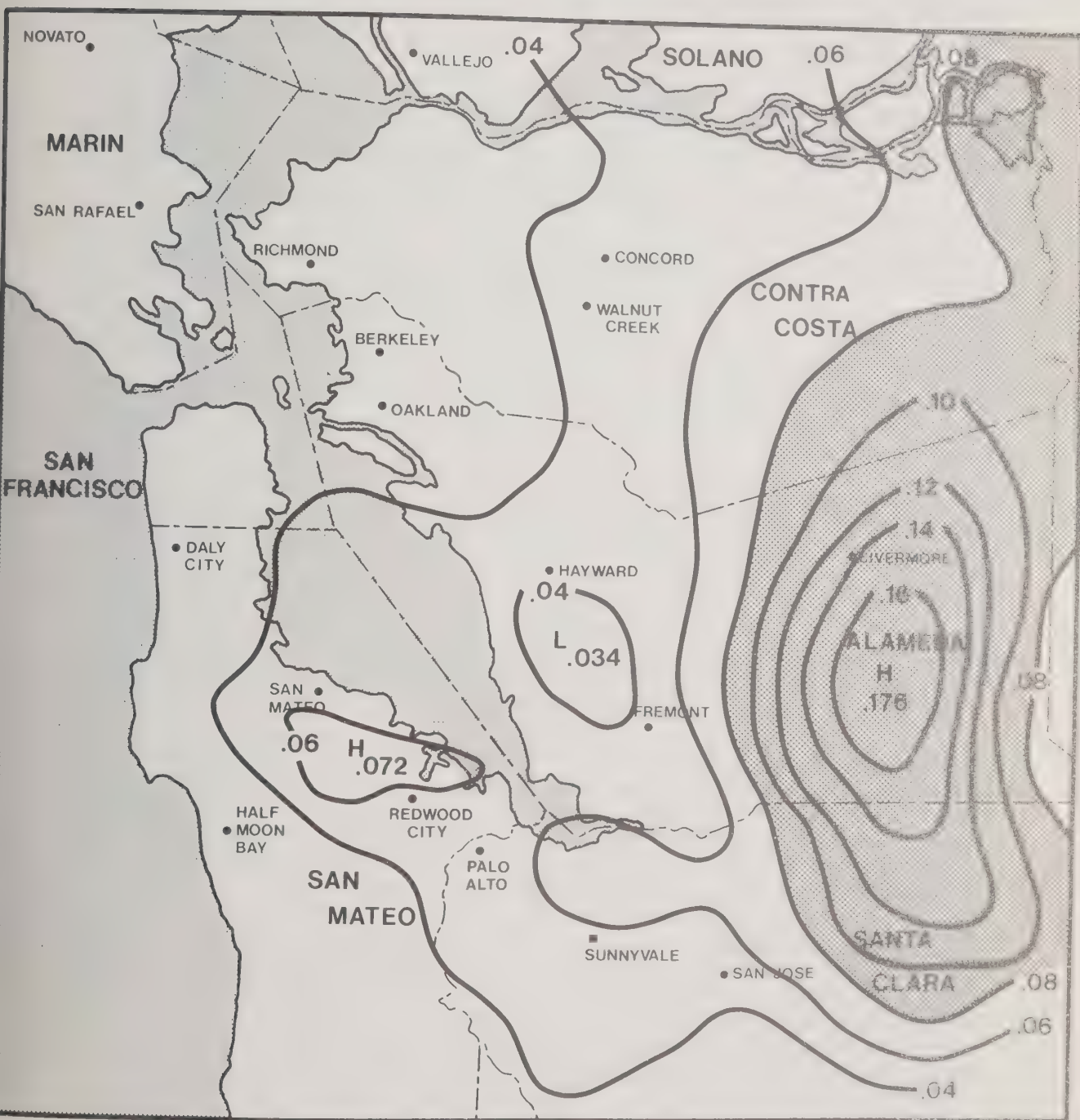
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Federal oxidant standard is 0.08ppm - 1 hour

Figure 17. Example LIRAQ Results - 1985 Baseline Ozone Projections



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Federal oxidant standard is 0.08ppm - 1 hour

Figure 18. Example LIRAQ Results - 2000 Baseline Ozone Projections



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Federal oxidant standard is 0.08ppm - 1 hour

Major Assumptions Used in the Baseline Oxidant Trends

Any projections of future conditions requires that certain assumptions be made. For air quality projections, many assumptions are made regarding future conditions. As subsequent AQMP updates are prepared, these assumptions need to be reviewed. New information and/or circumstances should be incorporated to AQMP updates so that the control strategies being applied can be examined for their overall effectiveness. As appropriate, new programs may need to be implemented. Conversely, control programs in effect can be reexamined to see if they are still needed. This section describes the major planning assumptions that were used to produce the baseline oxidant projections.

Population, Housing, Employment, and Land Uses. The "Provisional Series 3 Projections" (March, 1977) were generally used as the basis for demographic data needed. In particular, the upper range (commonly referred to as Base Case 1) of population was used. In 2000, it was assumed the region would grow to approximately 6.1 million people. (In the strategies analyzed for air quality improvement, the lower population assumption of 5.4 million people in 2000 was also analyzed for its air quality implications.)

Emission Inventory Projections. Emissions projections for stationary source and aircraft have been made by the BAAPCD, and are documented in several publications, e.g., "Emission Inventory Summary Report" (August 1976) and "Method of Projection" (May, 1977). Generally, the projections assume "normal" growth in the region consistent with the demographic projections made by ABAG. Transportation and mobile source emission projections were made jointly by ABAG, MTC and CARB. Again, these projections reflect anticipated growth in the region as forecast in the ABAG Series 3 projections.

Meteorological Assumptions. The data used in the LIRAQ analyses assume July 26, 1973 prototype meteorology. In essence, it assumes the meteorology which occurred on July 26, 1973 is typical of conditions conducive to adverse air quality in the region and capable of being repeated in 1985 and 2000. Additional prototype days are recommended for analysis in the continuing planning process.

Air Pollution Control Programs. The AQMP has assumed that existing control programs would continue to be implemented. It has also assumed that programs which have been adopted for implementation in future years will be carried out as currently scheduled. Of major significance in this latter category are the motor vehicle emission control programs of EPA and the CARB.

In general, the air quality baseline projections assume air pollution control programs currently "on the books" or adopted and scheduled for implementation. There is one exception and it is an important one. The BAAPCD has had in effect for a number of years Section 1309 of Regulation 2; this regulation requires a permit review of new or modified sources of pollution (the new source review program is commonly

referred to as the NSR regulation). The NSR regulation can have a variable impact on air quality depending upon the stringency of the rule adopted, the amount of off-set required, the conditions for issuing or denying permits, and the response of new and existing industries to the requirements.

Because the NSR rule is so difficult to predict (i.e., being a review program with variable impact), all the projections made by ABAG, MTC and BAAPCD were consistent in assuming no NSR rule for the baseline projections. As described later, the effectiveness of NSR is assumed in the alternative control strategy analyses. The fact that this program can have a variable air quality impact provides the AQMP with flexibility in later years. This assumption and its importance in the overall AQMP strategy recommended is explained further in Sections F and G.

Uncertainties in Assumptions and Analysis

There are two basic sources of uncertainty in the AQMP: uncertainties related to the projections and those arising from inaccuracies in the data and analysis tools used. Each of these sources should be considered in formulating the AQMP control strategies.

It should also be noted that uncertainties usually occur in two directions: They may result in either underestimates or overestimates of the control programs needed.

Forecasting Uncertainties. To prepare a long-range plan for attaining and maintaining air quality standards it is necessary to forecast what future air quality is likely to be, as well as what sources will contribute most significantly to future air quality problems. Such a forecast is required by federal regulations. In making these forecasts, a variety of assumptions must be made regarding how the region will grow, how effective existing air pollution control programs will be, and how future resources will be consumed. These assumptions have been documented in various AQMP Tech Memos, Issue Papers, and Projections Technical Advisory Committee (PTAC) Working Papers. Each assumption reflects some judgment, and alternative assumptions are always possible. The forecasting process for AQMP was designed to explicitly identify and discuss such assumptions before completion of the analysis, thus ensuring as much objectivity as possible.

The resulting forecasts indicate the most likely future of air quality in the region under various conditions. It is possible that trends will change or unexpected events will occur which would invalidate the forecasts. This is one reason for establishing a continuing planning program, for which the current AQMP would be an initial effort. In the meantime, decisions made now can and will affect future air quality. Despite the many assumptions which are made, a rigorous, objective forecast is a necessary key element of the AQMP.

Analytical Uncertainties. Independent of the difficulties related to forecasting future conditions are uncertainties inherent in the forecasting models. Models are used to better understand complex problems such as air pollution. Air quality models always have and will continue to contain inherent imperfections--this is a reflection of practical constraints on data acquisition, computer capacity, and the state of knowledge on the complex processes involved.

Despite the imperfect nature of modeling, the models being used in support of the AQMP are among the most sophisticated and most thoroughly tested models available. Verification tests of model performance have been conducted prior to and as part of the current AQMP effort. In addition, appropriate adjustments have been developed to temper model performance according to measured air quality data and expert judgment. The air quality modeling effort undergoes periodic review by a special modeling committee composed of modeling experts from the Lawrence Livermore Laboratory, California Air Resources Board, Bay Area Air Pollution Control District, Systems Applications Inc., U. S. Environmental Protection Agency, Metropolitan Transportation Commission, California Department of Transportation, and Association of Bay Area Governments. Thus, the resulting forecasts are as objective, rigorous, and accurate as possible at this time.

Section-E

ALTERNATIVE SOLUTIONS

Air quality improvements can be achieved in many different ways. As previously described, a variety of stationary and mobile source controls have already been implemented. This section inventories many of the still remaining control measures which might be considered for further air quality improvement. Many of the programs which are considered may in fact already be in existence, e.g., transit service, vehicle exhaust emission standards. What is considered then is a further strengthening or expansion of the program in place, e.g., more transit service, lower vehicle exhaust emission standards.

Because so many possibilities exist for consideration, the AQMP Joint Technical Staff and later the AQMP Advisory Committee were involved in screening the control options which were developed. The screening process led to a more manageable number of options which were evaluated further by the AQMP Joint Technical Staff. The control measures which have been recommended in Section G represent staff prepared draft proposals reviewed and modified by the ABAG Environmental Management Task Force (EMTF), Regional Planning Committee (RPC), Executive Board and General Assembly. The air quality strategy proposed is intended to meet the program objectives and be acceptable to EPA and CARB.

During the development of the initial staff prepared draft proposals, the Environmental Management Task Force (EMTF) expressed a number of concerns about the measures recommended and how they were arrived at. These concerns can be summarized as follows:

- o Completeness of the options considered.
- o Process for screening the options.
- o Criteria used to screen the options.
- o Need for EMTF and other policy making bodies to have a wide range of options to choose from in developing the plan recommendations.

This section attempts to address all of the concerns expressed by EMTF, RPC, and the Executive Board of ABAG. Both the process and the rationale used by staff to arrive at the plan's recommendations are presented. As the draft plan was debated by EMTF, other policy making bodies and various public and special interest groups during the public hearing process, numerous changes to the plan were made. This section includes documentation of the major changes made to the plan as it has evolved from a draft plan to the current plan recommendations.

INVENTORY OF OPTIONS (OR CANDIDATE CONTROL MEASURES)

The first step in the process of developing alternative solutions to the air quality problems was to prepare an inventory of options (also referred to as the candidate control measures). The procedure used by the AQMP Joint Technical Staff was to have each participating agency develop a list of options for their area of expertise and/or responsibility. Thus, the work was divided as follows:

<u>Agency</u>	<u>Area of Expertise/Responsibility</u>
Bay Area Air Pollution Control District	Stationary Source Controls
California Air Resources Board	Mobile Source Controls
Metropolitan Transportation Commission	Transportation Controls
Association of Bay Area Governments	Land Use Management/ Development Controls

As the inventory of options was being developed, input was requested from the AQMP Advisory Committee to ensure the list was as complete as possible.

Completeness of the Options Considered

Because of the very wide range of options which could have an impact on air quality, it is impossible to compile an absolutely complete list of options. However, the AQMP Joint Technical Staff did compile an exhaustive list of options. These options were generally viewed by staff as offering potential air quality improvement and worthy of some level of technical review and analysis.

As an example of how the options were viewed to be incomplete, an AQMP Advisory Committee member felt "population measures" should be considered in the AQMP. Later, when this issue was discussed by the EMTF, it was generally agreed that population control measures were inappropriate as a serious or viable option for improving air quality. Rather what needed to be spelled out to EMTF and the public were the air quality implications of the high and low population range forecast for the region. This has been done by staff.

The AQMP takes into consideration the inherent uncertainty of population forecasts. For the year 2000, both the high (approximately 6.1 million people) and low (approximately 5.4 million people) populations are projected to be equally plausible. Stated differently, either projection or anything in between is likely to occur given our current trends. The air quality implications are also clear. More people will mean more air pollution. All other things being equal, air quality will be worse in 2000 with 6.1 million residents than with 5.4 million residents.

To achieve the same level of air quality, the implication is a higher level of control will be needed to accommodate more people. Conversely, a lower level of control will be needed if there are fewer people in the region. The plan recommendations provide for flexibility to deal with this inherent uncertainty and yet provide for meeting and maintaining the air quality standards.

Other examples of control measures which the EMTF wanted considered in the process were:

- Fuel rationing (including gasoline rationing).
- Energy conservation (industrial and residential).
- Indirect source review (as an enforcement mechanism to implement the land use management and development controls).

These control measures and several others are discussed in the following section.

Control Measures Considered

Table 10 lists the inventory of air pollution control measures considered in developing the AQMP. The inventory is organized according to the participating agencies which prepared the component parts.

The control measures for stationary and mobile sources have traditionally been direct controls. As such they can be specified quite precisely. Many of the transportation controls and land use management measures are indirect controls. Thus, they tend to be described in more general terms. This is especially true for the land use management actions proposed. In Section G, the basic objectives of the land use management program are presented. Simply stated the objective is to reduce the number and length of automobile trips and to increase transit use in order to decrease the amount of regional automobile travel. This can be accomplished by achieving more compact development in the region by the year 2000. Recommendations are presented for policies and actions which might begin to achieve these objectives. Clearly there may be other policies and actions which can achieve the stated objectives. What EMTF and the public must determine is how to achieve the objectives in the most efficient manner acceptable to local governments and the general public.

PROCESS FOR SCREENING THE OPTIONS

Having developed an inventory of about 100 control measure options, the AQMP Joint Technical Staff proceeded to screen the options down to a more manageable size. Again, the agencies which developed the initial lists were primarily responsible for the initial screening. During the screening process the AQMP Advisory Committee was also asked to comment on which measures should be included for more detailed study. They were also given the opportunity to suggest other measures which may have been left out of the original inventory.

In conducting the screenings, the AQMP Joint Technical Staff attempted to avoid political judgments regarding a measures' implementability. The list of control options was screened primarily on the basis of technical effectiveness. Gas rationing serves as a good example. Nobody would debate that gas rationing could be an effective way of controlling air pollution. The debates about gas rationing center on its public and political acceptability and implementability. The AQMP Advisory Committee argued over whether gas rationing should or should not be screened out. In the end it was included in the screened options because it is technically effective. EMTF and the public could judge its political merits and public acceptability.

Table 10. Inventory of Air Pollution Control Measures

I. Stationary Sources

1. Require the use of high solid coatings where practical.
2. Require the use of water based coatings where practical.
3. Adopt the CARB standards for organic liquid storage.
4. Adopt closed system organic liquid storage with vapor recovery.
5. Require vapor recovery on small solvent users.
6. Adopt organic solvent regulation developed by the CARB Organic Solids Committee.
7. Enact a new maximum SO₂ emission limit of 300 ppm.
8. Require reduced sulfur content in fuels to .025%.
9. Adopt NO_x controls for non-highway and construction equipment.
10. Adopt NO_x limits for all new boilers.
11. Adopt lower particulate loading requirement - 0.05 to 0.1 grains/SCFM.
12. Adopt lower process weight allowable scale.
13. Adopt lower process weight maximum allowable scale.
14. Adopt best available control technology (BACT) regulation for existing sources with a time scale for compliance.
15. Adopt BACT regulation for all sources in lieu of emission concentration limits.
16. Adopt BACT regulation for all sources in addition to emission concentration limits.
17. Adopt a modern process technology rule aimed at promoting modernization of the areawide plant. This might, for instance, suspend a BACT rule for an agreement to modernize a plant with BACT included in modernized version. The intent of such a regulation would be to encourage modernization of old plants with new plants having improved pollution control technology.
18. Extension of current BAAPCD requirements to smaller operations, i.e., fewer exemptions.
19. New Source Review (NSR) - continue present rule.
20. New Source Review - Adopt 100% off-set policy.
21. New Source Review - Adopt 110% off-set policy.
22. New Source Review - Adopt a sliding scale for emission off-set.
23. NSR Options 20, 21 or 22 with a limited area for emission off-set.
24. NSR Options 20, 21 or 22 with inter-pollutant emission off-set.
25. NSR Options 20, 21 or 22 with no inter-pollutant off-set or inter-pollutant off-set governed by location, etc.
26. NSR Options 20-25 qualified so that no credit is allowed for emissions that are in excess of other limitations.
27. NSR Options 20-25 with arrangement for off-set banking, allowing a prospective new source credit for emission reduction off-set achieved beyond that required by existing regulations.
28. Adopt regulations to promote industrial energy conservation.
29. Plant operation scheduling:
 - a) Seasonal scheduling to reduce polluting operations during critical weeks or months as determined by meteorology.
 - b) Scheduling maintenance down time and vacations, possibly short downs, to reduce pollutant load at critical times.
 - c) Interruptable operation dependent upon air quality conditions.
- d) Stagger operations between plants to spread operation over seven days instead of five. Assign plants a 5 day week starting on any one of the seven days, possibly with some on 4 day 10-hour operation.
- e) Stagger work hours. For instance, run coating lines only between 4 PM and midnight instead of 7 AM to 3 PM.
- f) Schedule reduced work days during the smog season with or without longer days during less critical seasons. Rationing the pollution absorbing capacity.
30. An air monitoring and meteorological analysis to identify and recommend mitigation measures, for certain localized problems.
31. Adopt particulate regulation based on particle size.
32. Replace throw-away container with re-usable containers.
33. Burn solid waste near point of generation, to reduce long hauls.
34. Apply 1309 with modified trade-off of 1311 and 1311-2 clearly described as an option.
35. Requiring some sort of retrofitting on older plants. Apply BACT to newer plants through permit system.
36. Penalty charge or tax based on amount of emission to encourage reduction.
37. Lowering the Reid vapor pressure of gasoline to reduce hydrocarbon emissions from storage, handling and use of motor vehicle grade gasoline.

II. Mobile Sources

1. Implement an evaporative emissions retrofit program for all vehicles.
2. Implement a catalytic retrofit program for past-71' vehicles able to operate on unleaded gasoline.
3. Adopt more stringent application of compliance procedures.
4. Adopt more comprehensive new and used motor vehicle surveillance program.
5. Adopt a mandatory vehicle inspection and maintenance program for light and heavy duty vehicles.
6. Adopt more stringent evaporative emission standards.
7. Implement a heavy duty gasoline exhaust emission retrofit program.
8. Adopt more stringent exhaust emission standards for new light and heavy duty vehicles.
9. Promote the use of new or modified fuels.
10. Promote the use of alternative power sources.
11. Establish emission standards for other mobile sources such as construction equipment, locomotives, ships, or recreational vehicles.

III. Transportation Controls

1. Measures to Improve Traffic Operations
 - A. Improve Traffic Flow
 - 1) Computerized traffic control
 - 2) Ramp Metering
 - 3) Traffic engineering improvements
 - 4) Off-street freight loading
 - B. Reduce peak-period traffic volumes
 - 1) Staggered work hours
 - 2) Four day work week
 - 3) Off-peak freight delivery
2. Measures to Reduce Vehicle Use
 - A. Restrict Vehicle Ownership
 - 1) Additional license fee
 - 2) Registration limits
 - B. Management of Auto Access
 - 1) Better enforcement of parking regulations
 - 2) Limit on number of parking spaces
 - 3) On-street parking prohibited during peak hours
 - 4) Area license
 - 5) Auto-free zones
 - 6) Gas rationing
 - C. Increase Cost of Auto Use
 - 1) Road pricing
 - 2) Increased parking costs
 - 3) Parking fee for shopper
 - 4) Eliminate free employee parking
 - 5) Increased gas tax
 - 6) Increased tolls
 - 7) "Smog charges"
 - D. Reduce the Need to Travel
 - 1) Communications substitutes
 - 2) Goods movement consolidation
3. Measures to Encourage Alternative Model of Travel
 - A. Increase Transit Ridership
 - 1) Additional transit service
 - 2) Fare reductions
 - 3) Improved comfort
 - 4) Bus and carpool lanes
 - B. Encourage Pedestrian Mode
 - C. Encourage Bicycle Mode
 - D. Encourage Ride Sharing
 - 1) Toll reduction for carpools
 - 2) Preferential parking and carpools
 - 3) Carpool matching information
 - 4) Assist vanpool formation
 - E. Promote Para-Transit Alternatives

IV. Land Use Management/Development Controls

More effective management of all five major aspects of land development through coordinated action by cities, counties, special districts, or regional and State agencies to reduce the magnitude and frequency of auto travel:

1. Timing - expand the presently very limited application of timing controls such as growth sequence zoning, building permit quotas, staging of sewer and water infrastructure and plant capabilities, etc.
2. Quantity - expand the presently scattered application of quantitative controls on development such as performance standard zoning and limited sewer and water infrastructure and plant capacities.
3. Location - Improve the presently inconsistent application of controls on the location of development such as coordinated management of infrastructure location, annexations, public land acquisition, agricultural preserves, hillside and soil conservation, and development moratoria.
4. Density - Encourage transit usage and other non-auto modes with coordinated density policies among local jurisdictions through the application of innovative density zoning mechanisms (slope density, building height regulations, etc.) fully coordinated with service capacities and commitments.
5. Type - Reduce home-to-work & home-to-non-work travel by encouraging more land use mix, especially in terms of housing/jobs balance.

The list of screened options was presented to EMTF in June, 1977 during a presentation of alternative air quality strategies. At that meeting EMTF approved the screened listing of control measures for use in developing alternative air quality strategies. EMTF reserved the right to consider other measures at a future date, but directed staff to continue the detailed analysis of the measures presented. These control measures were to be grouped into a series of control strategies for testing of their air quality effects. This has been done by staff and is described in the following chapter.

OPTIONS CONSIDERED BUT NOT INCLUDED IN THE PLAN

Using the screened inventory of control measures as a starting point, the AQMP Joint Technical Staff analyzed the remaining control options further. Since it was clear by now that the focus for this plan was meeting the oxidant standard, additional measures were eliminated. For example, in some of the earlier progress reports, several measures were included to control sulfur dioxide emissions. Since the more detailed evaluation of the sulfur dioxide problem is proposed for the continuing planning process, these measures were dropped from this current plan. Another example of control measures temporarily deferred is the use of best available control technology for sulfur dioxide and particulate controls. The revised best available control technology proposal concentrates on reducing hydrocarbon emissions from a number of categories.

Tables 11-14 summarize the options considered in the AQMP but not included as part of the plan. EMTF and other policy makers, in considering the stationary and mobile source controls and transportation measures, were asked to address two issues:

- Are there additional stationary and mobile source controls and transportation measures that should be included?
- Are there stationary and mobile source controls and transportation measures that should not be included?

As previously noted, land use management and development controls were considered to achieve specific objectives--reducing the number and length of automobile trips to reduce regional travel. Specifically, a series of policies and actions which could be adopted to reduce vehicle travel were developed.

- Will the proposed land use policies and actions achieve the objective of reducing regional travel?
- Are there other policies and actions which should be included?
- Are there land use policies and actions included which should not be?

In considering the recommendations of the Environmental Management Task Force, the Regional Planning Committee and the Executive Board, the General Assembly adopted certain control measures for the plan, and did not include others. The other measures considered and rejected for the initial plan are summarized in the tables. The General Assembly reserved for itself a right to make other changes in the plan during the continuing

planning process, as adopted control measures are examined for their actual effectiveness and as air quality as measures by ozone levels is actually improved. Other control measures may be determined to be necessary and may be included at some future date if determined by the General Assembly to be necessary to maintain the Federal or State standard.

Table 11. Options Considered But Not Included in the Plan (Stationary Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
1. Enact new maximum SO ₂ emission of 300 ppm.	Affects sulfur recovery, sulfuric acid plants and combustion operations burning fuel oil, etc.	0	0	BAAPCD Engineering Estimate	Deferred for closer examination in the continuing planning process (CPP); this program is directed at controlling SO ₂ .
2. Reduce fuel sulfur content to 0.25%.	Affects sulfur recovery sulfuric acid plants and combustion operations burning fuel oil, etc.	0	0	BAAPCD Engineering Estimate	Deferred for closer examination in the continuing planning process (CPP); this program is directed at controlling SO ₂ .
3. Adopt NO _x controls for non-highway and construction equipment.	Primarily modifications on agricultural tractors, construction equipment, steamships, locomotives and two cycle engines.	0	0	BAAPCD Engineering Estimate	Possible conflict with the proposed oxidant control strategy. Requires closer examination.
4. Adopt NO _x limits for all new boilers.	Long term (15 to 30 years) program to require a new NO _x limit on boilers < 250 million BTU/hr. rating.	0	0	BAAPCD Engineering Estimate	Possible conflict with the proposed oxidant control strategy. Requires closer examination.
5. Adopt lower particulate loading - 0.1 to 0.05 gr/SCFM.	Primarily a change from any cyclone control to BAG House or Electrostatic Precipitator on 1000's of small operations.	0	0	BAAPCD Engineering Estimate	Deferred for closer examination in the CPP, this program is directed at controlling particulates.
6. Lower process weight allowance scale.	Less than 100 sources (e.g., Catalytic Crackers, Fluid Coking, Kilns and Fertilizer Plants) affected.	0	0	BAAPCD Engineering Estimate	Deferred for closer examination in the CPP, this program is directed at controlling particulates.
7. Lower process weight maximum.	Less than 100 sources (e.g., Catalytic Crackers, Fluid Coking, Kilns and Fertilizer Plants) affected.	0	0	BAAPCD Engineering Estimate	Deferred for closer examination in the CPP, this program is directed at controlling particulates.
8. Options 14-18 (Table 9) are all forms of BACT.	Best Available Technology with minor variations.	Very Significant		BAAPCD Engineering Estimate	Included in the AQMP (See Specific Proposals and Control Categories covered).

Table 11. (con't). Options Considered But Not Included in the Plan (Stationary Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
9. Options 19-27 are all forms of New Source Review.	Review of new or modified sources; many variations as described.	Significant		BAAPCD Engineering Estimate	Included in the AQMP (See Discussion in Chapter 7).
10. Institute a comprehensive program to reduce energy use.	Efficient building heating and air conditioning, reduction of illumination & display lighting - promote heat recovery.	Not Significant		BAAPCD Engineering Estimate	Will reduce emissions but would be primarily fuel conservation measures; it is not significant as an organic control.
11. Plant operation scheduling - (many options as described in Table 9).	Seasonal (day, week, month) scheduling including close attention to interruptable operations & staggering operations on 7 vs. 5 day/week.	Not Significant		BAAPCD Engineering Estimate	Generally difficult due to social-economic factors and not a factor in reducing organic emissions. Does not conform with Federal and State approach of <u>continuous, positive</u> emission reduction program.
12. Air monitoring combined with meteorological analysis.	Approach relies on accurately predicting problems and implementing needed controls.	Not Significant		BAAPCD Engineering Estimate	Isolates air pollution problems--not significant in organic emission control. Again, is not a continuous, positive emission reduction program.
13. Adopt particulate regulation based on particle size.	Self explanatory.	0	0	BAAPCD Engineering Estimate	No effect on organic emissions (particulate control proposal).
14. Replace throw-away container with reusable containers.	Self explanatory.	0	0	BAAPCD Engineering Estimate	No appreciable effect on organic emissions.
15. Burn Solid Waste near point of generation to reduce long hauls.	Self explanatory.	Not Significant		BAAPCD Engineering Estimate	Not a significant source of organic emissions; low potential benefits.
16. Apply 1309. with modified trade-off of 134 & 1311.2.	New Source Review with clearly defined variations.	Significant		BAAPCD Engineering Estimate	NSR Rule included in AQMP.

Table 11. (con't.) Options Considered But Not Included in the Plan (Stationary Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
17. Require some sort of retrofitting on older plants.	Applies BACT to newer plants plus retrofit of existing plants on a time schedule.	Significant		BAAPCD Engineering Estimate	Included in AQMP as NSR and BACT. Reducing emissions in this manner and permit additional growth in region.
18. Penalty charge or tax based on amount of emission to encourage reductions.	Emission charge for contaminants to effect industrial control changes to BACT.	Not Significant		BAAPCD Engineering Estimate	Open to charge that large companies can buy emission allowance.
19. Lowering the Reid Vapor Press of gasoline to reduce hydrocarbon emissions from storage & handling vehicle.	Affects ~ 4 million vehicles, 6000 service stations, 60 bulk plants and all refineries & some chemical plants.	30	35	BAAPCD Engineering Estimate	An ongoing American Petroleum Institute study indicates that this option is not viable. When formal report is available, this option should be re-examined.

Table 12. Options Considered But Not Included in the Plan (Mobile Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
o Implement an evaporative emissions retrofit program for all vehicles, and/or recommend catalytic retrofit program for post '71 vehicles able to operate on unleaded gasoline.	Retrofit programs consist of the addition of a new item, or the modification or removal of an existing item of equipment on a vehicle after its initial manufacture.			Reductions from evaporative retrofit programs assume that a 25% reduction can be attained from pre-1980 vehicles. Reductions from catalyst programs assume 50% reduction can be attained by retrofitting non-catalyst vehicles. There would be no benefits by 2000 because the affected vehicles will have been retired.	Retrofit programs become less effective as old pre-controlled cars are retired. Thus, this is a short term measure. By 1975 the pre-catalyst vehicles (1971-1975) and pre-2gm/test vehicle (i.e., pre-1980) will only represent about 2% and 20%, respectively, of the total vehicle miles travelled. Since these percentages decrease rapidly thereafter the high cost and the short term benefit of this program does not appear to warrant it.
	In the Bay Area all non-exempt vehicles undergoing change-of-ownership or initial registration require the installation of:				
	(1) An NO _x control device for '66-'70 models.				
	(2) An exhaust emission control device for '55-'65 models.				
	(3) A crankcase emission control device for '55-'62 models.				
	There have been no further developments of any retrofit programs to date.				
	<u>Type of Retrofit Program</u>				
	Evaporative	~ 4	Not		
	Catalyst	~ 6	Applicable		
o More stringent certification of compliance procedures.	New vehicles from each engine family are randomly selected from the manufacturers and tested for their emission characteristics by the CARB. More rigorous certification testing procedures could be employed to reduce maintenance requirements of engine components which influence emissions or, where possible, eliminate this maintenance completely. More stringent warranty conditions on emission control systems could also be utilized.	-	-	The air quality benefits could be assumed to be the same as those reductions shown for the motor vehicle inspection program in 2000. This measure could not be feasibly implemented by 1985.	This measure could eventually replace the need for a Motor Vehicle Inspection Program (MVIP). The new technology that would be required to satisfy this control measure would take years to develop. Since this time frame is not known, it was decided to keep MVIP through the year 2000.

Table 12. Options Considered But Not Included in the Plan (Mobile Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
(Continuation of previous Recommendation)	CARB has recently adopted regulations in certification test procedures for 1980 and later model vehicles that will require manufacturers of vehicles to make carburetors almost tamper-proof. This measure would recommend more stringent certification requirements which would promote changes in vehicle designs to minimize the need for maintenance and the possibility of tampering.				
o Adopt a more comprehensive new motor vehicle surveillance program.	<p>Currently, all production vehicles are checked at the end of the assembly line to ensure that the emission control systems are properly installed and functional. The manufacturer also tests 2% of all vehicles using prescribed Federal test procedures. ARB staff periodically examine the manufacturers' quality control facilities. In addition, all new vehicles at dealerships and preparation centers are spot-checked.</p> <p>Title 13 of the California Administrative Code gives ARB the power to implement standards for engine setting tolerances, idle emissions and inspections of control systems to which new and used vehicles must conform as a condition of sale.</p> <p>Cross-check testing could be randomly performed on production vehicles currently being tested by the manufacturers. Dealership inspections could be ex-</p>	0	0	The benefits of this program are assumed to be achieved by the proposed Motor Vehicle Inspection Program (MVIP).	Since all newly acquired vehicles must be registered with the Department of Motor Vehicles, these vehicles could be required to satisfy MVIP requirements before such registration. Thus, it is assumed that the MVIP would eliminate the need to step-up this existing program.

Table 12. Options Considered But Not Included in the Plan (mobile Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
(Continuation of previous Recommendation)	panded to include used as well as new vehicles to deter maladjustments being made to maximize vehicle performance.				
o More stringent evaporative emission controls.	<p>Evaporative emissions from the fuel system are produced by two effects, (1) daily ambient atmospheric temperature variations and (2) higher fuel temperature after vehicle usage.</p> <p>Since 1970, gasoline evaporative emission control systems have been installed on all new cars sold in California to reduce emissions from the carburetor and fuel tank. Control of heavy duty vehicles begin with 1983 model year.</p> <p>More stringent evaporative emission standards have been adopted for 1980 and subsequent model year vehicles. A new certification test procedure will also be used beginning in 1978.</p>	0	0	The 1980 standards are already close to vehicle background levels. Thus further reduction would result in not appreciable benefits.	Stabilized background evaporative emissions, from painted or greased surfaces or vinyl upholstery, are thought to represent 40-50% of the 2 grams per test standard promulgated for post-1980 vehicles. Thus, further reduction would not be significant.
o Promote use of new or modified fuels.	The modification of fuels has been and continues to be investigated in an effort to come up with an efficient non-polluting fuel. Much experimentation has also been done on the use of alternative fuels such as methanol, hydrogen, and other types of fuels.	-	-	Not Applicable	Since new technological developments in emission control is a result of more stringent emission standards, this measure may be a result of the proposed control measure to reduce emission standards by 50%. Thus the effect would be comparable.

Table 12. Options Considered But Not Included in the Plan (Mobile Sources)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
o Promote use of alternative power sources.	The development of non-polluting power sources has progressed rapidly over the last 5-10 years. Unfortunately there has not been a strong push for mass producing any of these engine types.	-	-	Not Applicable.	Same rationale as for "new or modified fuels."
o Emission standards for other mobile sources.	This would include the adoption of emissions standards for mobile sources such as construction equipment, locomotives, ships, or recreational vehicles.	-	-		Emissions from off-highway mobile sources for 1985 are 50.3 t/d for HC, 73.7 t/d for NO _x and 322.6 t/d for CO, and for 2000 75.4 t/d, 94 t/d and 389.3 t/d, respectively. Staff believes that these sources may be controllable, but there does not seem to be any available information as to the extent of this control. Thus this measure was dropped at this time due to lack of adequate information, but should be looked at in future updates of the plan.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
I. <u>MEASURES TO IMPROVE TRAFFIC OPERATIONS</u>					
A. <u>IMPROVE TRAFFIC FLOW</u>					
This general class of controls is designed to improve air quality by smoothing the flow of traffic. Since certain emissions increase due to "stop and go" traffic conditions, smoothing traffic flow would help reduce overall emissions. Traffic flow improvements are particularly suited to alleviating carbon monoxide problems. However, because of increasingly stringent motor vehicle emission standards for new cars, CO is not expected to be a long-term regional problem in the Bay Area, although local "hot-spots" may surface. These can be dealt with on an individual basis.					
Computerized Traffic Control	Traffic flow would be improved through a system of computerized traffic signals on selected arterial streets.	Negligible		Emissions vs. Speed Curves	This measure was dropped early in the analysis because only very small reductions in oxidant precursors would be achieved through speed improvements, especially considering the small portion of regional traffic that would be affected. Also, the improved flow might induce additional travel, which would offset any gains in air quality. A quantitative assessment was not conducted.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Traffic Engineering Improvements	Traffic flow can be improved by a number of small projects which would redesign intersections or small street segments. However, if overall capacity were increased, and more trips generated, there could be a negative air quality effect.	Negligible		Emissions vs. Speed Curves	This measure was dropped in the first screening because it would affect only a small portion of travel, and any air quality effects would likely be insignificant. A quantitative analysis was not conducted.
Off-Street Freight Loading	Zoning regulations would specify off-street freight handling, which would improve traffic flow and hence air quality.	Negligible		Emissions vs. Speed Curves	The improved flow would have very little effect on oxidant precursors. Thus this measure was dropped in the initial screening without qualification.

B. REDUCE PEAK PERIOD TRAFFIC VOLUMES

Much of the peak oxidant problem can be traced to emissions generated during the morning hours. This is due to the time required for photochemical reactions to take place. Any reduction or spreading of these early morning emissions could possibly reduce the intensity or shift the location of peak oxidant concentrations. However, current knowledge of oxidant formation indicates that a very large shift in time would be required and moreover the measures in this category would be difficult to implement to the degree necessary to have this significant effect.

1. Staggered Work Hours	This program would shift the daily work schedule so that all employees would not arrive and leave at the same time. This could take the form of "staggered hours," where subgroups of a total work force operate on a fixed schedule, or "flex-time," where employees are given the option of determining their own hours within certain limits. This measure could improve air quality by a) reducing congestion, b) spreading early morning emissions, and c) providing employees with an opportunity to adjust their schedules to accommodate other modes of travel.	Negligible	-	Previous studies and MTC staff judgement	This measure was eliminated at the initial screening because it would redistribute auto trips, rather than eliminate them. Although the air quality benefits would be slight, it may be desirable to implement this strategy for other reasons, such as reduction in congestion.
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Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Four Day Work Week	The standard work week would be shortened to four days, with the work day lengthened and/or the weekly hours worked shortened. One-fifth of the commute travel could be eliminated, but the additional leisure time would probably generate other recreational or shopping trips.	Negligible	-	Previous studies and MTC staff judgement	Because of the potential for additional trips, it was felt that this measure would have only a small effect on air quality, and it was therefore eliminated during the initial screening.
Off-Peak Freight Delivery	Freight deliveries would be prohibited during peak periods. This would both reduce peak period traffic and also improve traffic flow by removing the slower vehicles and the trucks stopped while loading.	Negligible	-	Previous studies and MTC staff judgement	Only a small percentage of regional travel would be affected by this measure, and so any air quality improvement would be virtually undetectable. This measure was therefore dropped from further consideration during the initial screening.

II. MEASURES TO REDUCE VEHICLE USE

A. MEASURES TO RESTRICT VEHICLE OWNERSHIP

This strategy is designed to reduce travel by limiting the number of vehicles.

Additional License Fee.	This measure could take a number of forms. It could be a tax increase on all cars, or one which would put a progressively heavier tax on the more polluting cars. Another alternative would be to tax second or third cars in a household and so reduce mobility.	Negligible	-	Previous studies and MTC Staff judgement	Although this measure is appealing from an implementation standpoint, at least one study* has indicated that an annual fee would not be a significant factor in a decision to own or drive a car, unless the fee was extremely high. This measure was thus dropped in the initial screening.
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*R.H. Pratt Associates, Inc., "Transportation Controls for Air Quality Improvements in the National Capitol Region," October 1976.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Registration Limits.	Instead of taxing vehicles with higher pollution potential, this measure would set limits on the numbers of such vehicles which could be registered. The EPA promulgated TCP proposed a ceiling on motorcycle registrations, but this measure was dropped in final version.	Negligible		Previous studies and MTC Staff judgement	The implementation and equity problems of this measure are formidable. Because of this, the program could not be set up at a scale which would have a significant effect on air quality. This measure was eliminated during the initial screening.
B. MANAGEMENT OF AUTO ACCESS					
	This strategy would discourage auto use by restricting the areas where autos can travel or park.				
Better Enforcement of Parking Regulations.	There are many current parking regulations which, if enforced, could discourage certain auto trips. Notable among these are the restrictions on long-term parking which could persuade some commuters to take transit. Other actions, such as enforcement of truck loading zones, could result in a smoother flow of traffic.	Negligible		MTC staff judgment	Because staff believed that the current number of violators was relatively low, the resultant effect in air quality would be small. However, this measure could be effective in jurisdictions where enforcement is currently lax. The measure was eliminated during the initial screening.
Limit Number of Parking Spaces.	The intent of this measure is to reduce the available parking and so limit the number of autos which can effectively use the controlled area. There are two implementation options: (a) limit the construction of new parking facilities, and (b) cut back the number of parking spaces already available.	~ 0.4	*	Travel Model Analysis	The effect of freezing parking in the CBD's was investigated. Although this measure is effective, it was not included because of the potential for inequity between the large downtown areas and the smaller cities. However, it does remain a possible option.
Prohibit On-Street Parking During Peak Hours.	This measure is designed to improve air quality primarily by improving the flow of traffic. It also serves to discourage certain trips since it limits the available parking.	Negligible		MTC staff judgment	This measure was not pursued since it is currently practiced by the major cities in their CBD's.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Area License	A special license would be required to bring a car into certain designated areas. This would encourage a shift to other modes.	Variable		Previous studies and MTC staff judgement	In the past few years there has been increased interest throughout the world in the possibility of imposing user charges to discourage automobile travel in major urban areas. Singapore instituted a program which has been successful but no cities in Europe or North America have tried this concept. A similar type of program was under discussion in Berkeley but was not pursued. Although congestion pricing would certainly be effective in reducing auto-related emissions, this measure was eliminated during the initial screening because of equity problems, implementation problems and public acceptability. It was felt that a similar effect could be obtained, at least in the CBD's, by increasing long-term parking rates.
Auto Free Zones	This measure involves the designation of areas within a city (e.g., CBD's where vehicles are prohibited, with the exception of buses, taxis, and emergency vehicles). This technique can result in an improved pedestrian environment and would encourage people to use transit for the entire trip. To develop traffic, necessary freight movements, improved transit access, and, in some cases, parking structures on the fringes. This concept has proved successful in a number of cities, most in Europe. In the U.S., the major examples of such zones have been shopping malls.	~ 0.1	*	Travel Model Analysis	An area within the San Francisco CBD was analyzed as a potential auto control zone. This roughly corresponds, to the area recommended in the revisions to the Transportation Element of the San Francisco General plan.* This measure was recommended in the draft AQMP. During the public review of the plan, this measure was deleted and recommended for further study. The City of San Francisco is initiating such a study in July, 1978. *Adopted by the San Francisco City Planning Commission. Resolution No. 7657, January 20, 1977.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Gas Rationing	This is generally considered the "ultimate" measure. The supply of gasoline is limited in an effort to cut travel and thus pollutant emissions. This measure would have significant administrative problems.	Variable		Joint Technical Staff estimate	This measure was not considered for inclusion in the draft AQMP because of the significant administrative problems and public acceptance problems which would surface. Overall <u>fuel</u> rationing has been suggested as an alternative to gas rationing in an effort to spread the burden over all segments of the economy. It should be noted that since autos will constitute only 15% of regional hydrocarbon emissions in 1985, a 20 percent cutback in gasoline availability would reduce regional hydrocarbon emissions by approximately 23 tons.

C. MEASURES TO INCREASE COST OF AUTO USE

Another way of discouraging auto use is to increase the cost of auto commuting relative to transit or carpooling. However, it generally takes a fairly large increase to effect a significant shift to transit. The more effective pricing strategies are those which serve as daily visible reminders of the real costs of auto commuting.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

EST. HYDROCARBON
EMISSION REDUCTIONS
(Tons/Day)

RECOMMENDATION	DESCRIPTION	1985	2000	BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
Road Pricing Techniques	This measure could be implemented in two distinct ways. In one, a fee would be charged for the use of certain roads. This is similar to a toll, except that it is more widespread and would likely not be collected at a tollbooth. Instead, some system of in-car meters or electronic scanning devices might be used as automatic billing devices. The second form is a congestion toll, where the rates would increase with the level of congestion.	Negligible		Previous studies and MTC staff judgement	These measures have not yet been tried as air quality strategies. The technology is not readily available for the first and the second is still fairly new and untested. For this reason, and because of problems in public acceptability, this measure was dropped in the initial screening. The discussion included under measure B(4) is also applicable to this measure.
Increased Parking Costs	The purpose of this measure would be to discourage auto use by increasing the overall commute cost via additional parking charges. A special parking tax of 35 percent, to be levied on all vehicles parking between 6 and 10 a.m., has been proposed.	~ 0.3	*	Travel Model Analysis	The 6-9 a.m. period was selected to minimize the additional burden on those driving for non-work purposes. This measure was recommended in the draft AQMP. During the public hearings and plan review process, however, this measure was deleted. A major concern expressed was its questionable effectiveness and the competitive advantage of those lots not imposing the parking tax.
Minimum Parking Fee at Large Shopping Center	Most of the measures that were considered focused on the work trip. Other trips, such as shopping, are important in the formation of air pollution but are not as susceptible to diversion to transit. However, many of these trips are made to purchase only one or two items. If the shopper were to consolidate these single trips	See Description and Comments			Staff was unable to quantify the effectiveness of this measure because of the lack of experience with this type of action. However, we estimate that shopping trips in 1985 will generate 53 tons of HC, 826 tons of CO, and 39 tons of NOx daily. This is significant, and therefore this measure was recommended.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
(Continuation of previous Recommendation)	into one or two weekly trips, the air quality effect could be important. To encourage this consolidation of trips, a minimum 50¢ parking fee at shopping centers that maintain over 500 parking spaces was proposed.				
Eliminate Free Employee Parking	Employers located outside the CBD's virtually always provide their employees with free parking. To encourage these employees to shift to transit or carpools, this measure specifies a \$1.00 parking fee be levied at all employee lots of 500 or more spaces.	~ 0.9	*	Travel Model Analysis -	Although these reductions are relatively high, it was felt that the current lack of transit access to many industrial areas would be a hardship. Therefore, this measure is not recommended at this time.
Additional Gasoline Tax	The gas tax would be raised to reduce the demand for vehicular travel. The extra revenue would be used to finance transit improvements or other non-auto alternatives. Unfortunately, the energy crisis of 1974 demonstrated that, even with a rather large increase in cost, the use of autos did not decrease significantly. This experience showed that a 10% increase in pump price facing the consumer would cut the demand probably 1.5%. In the long run, the application of this measure would probably produce a shift toward smaller, more fuel-efficient cars. The imposition of this measure raises questions of equity, since the poor and those not having access to transit would be penalized most severely.	< 0.1	—	Travel Model Analysis	A 15¢/gal increase in the gas tax would reduce HC emissions in 1985 by less than 0.1 ton/day. The CO reduction was 0.8 tons/day with NOx reduced less than 0.1 ton/day. This measure was eliminated during the secondary screening.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Increased Tolls.	Bridge tolls would be increased to reduce the volume of autos using the facility and to generate revenue which could be used to finance improvements in the transit system. MTC was recently given authority over the level and use of tolls on the trans-bay bridges. Tolls on the Bay, San Mateo, and Dumbarton bridges were recently raised to 75¢. The Golden Gate Bridge District has just adopted a \$1.00 toll.	~ 0.2	*	Travel Model Analysis	A peak toll of \$1.25, with an off-peak toll of \$1.00, would reduce HC by 0.2 tons/day, CO by 3.1, and NO _x by 0.2 (1985 emissions). In addition, over \$12 million additional revenues would be generated annually, which could be used for transit improvements. This measure was recommended in the draft AQMP. During the public hearings and plan review process, however, this measure was deleted. A major factor in deleting the measure was the inequity of its impacts.
"Smog Charges."	This measure would assess an additional charge on the auto driver for the pollution generated by the automobile, thus encouraging a shift to other forms of transport or to less polluting cars. The implementation could be done through some of the measures already mentioned, such as the gas tax or registration fee, possibly accompanied by some rebate scheme for those autos with superior emissions control equipment.	Negligible		MTC staff judgment	The effectiveness of this measure was judged to be similar to that estimated for the additional gas tax. An extremely high charge was thought necessary to effect significant reductions in auto use - the measure was therefore eliminated during the secondary screening.

D. MEASURES TO REDUCE THE NEED TO TRAVEL

This strategy is designed to maximize or eliminate unnecessary travel. Unfortunately, the effectiveness and feasibility of these types of measures are uncertain.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Communications Substitutes.	Certain trips could be eliminated by using other means of communication. This could include business trips as well as shopping trips. The technology for visual communications is becoming more available. However, the extent to which the public will adapt to these new systems is uncertain. The rapid growth in electronic communications in the past decade has not reduced the need to travel.	Uncertain, probably negligible		See comments	This measure was eliminated in the initial screening because its proven effectiveness in the near term is doubtful.
Goods Movement Consolidation.	This measure would reduce truck travel by consolidating freight deliveries. Basically, the concept is to have one terminal where the freight is delivered and sorted, and then small trucks would complete the delivery. The measure would thus decrease truck VMT and probably also reduce auto emissions as well by permitting a smoother traffic flow.	Negligible		MTC staff judgement	The effectiveness of this measure would be minimal because of the small percentage of travel that would be affected. The measure was thus dropped in the initial screening.

III. MEASURES TO ENCOURAGE ALTERNATIVE MODES OF TRAVEL

A. INCREASE TRANSIT RIDERSHIP

This set of measures would provide incentives for transit as an alternative transportation mode. For many commuters transit is a viable option, yet additional incentives need to be provided to induce significant diversion from the automobile. The following measures are designed to promote the transit mode.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
		1985	2000		
Fare Reductions	There are a number of variations of this measure. One is to simply reduce or eliminate transit fares. This would probably not be very effective, since the fares throughout the Bay Area are already relatively low. A second option is some form of a monthly pass. This has good potential since it would eliminate the psychological impediment of repeated payments, and so would encourage the diversion of casual trips to transit. A related option is the coordination of transfers between systems.	Negligible		Previous Studies and MTC staff	Because of the current low fare level, further reductions could conflict with regional policy and potentially state law. The monthly pass would probably not have significant air quality effects, but may be a desirable mechanism for encouraging transit ridership.
Improved Transit Comfort	This measure seeks to reduce the differences between the auto and transit modes by improving the comfort of transit service. This would be done by providing shelters at bus stops, better security, more comfortable buses, or other amenities.	Negligible		MTC staff judgement	It is believed that improved amenities alone would not significantly influence transit demand. Moreover, most of the existing transit development programs in the Bay Area will involve new, comfortable buses, additional bus shelters and radio communication. Thus, this measure was dropped from consideration in the initial screening.

Table 13. Options Considered But Not Included in the Plan (Transportation Controls)

EST. HYDROCARBON
EMISSION REDUCTIONS
(Tons/Day)
1985 2000

RECOMMENDATION	DESCRIPTION	1985	2000	BASIS FOR ESTIMATE	COMMENTS AND SCREENING RATIONALE
B. ENCOURAGE THE PEDISTRIAN MODE					
<u>Provide Pedestrian Amenities</u>					
	For short trips, walking is frequently the best alternative. Providing amenities such as wider pavements, or moving sidewalks between major activity centers can encourage people to walk for short trips.	Negligible		Previous Studies and MTC staff judgement	A survey of previous studies indicated that, with the exception of auto-free zones, the provision of these amenities would not produce a significant shift from the auto. Rather, it is the dense land use pattern itself which generally encourages pedestrian activity. Since the auto-free zone was already included as a separate measure, we felt that the provision of these other amenities was not warranted from a strict air quality perspective.
C. MEASURES TO ENCOURAGE RIDE SHARING					
	Carpooling has good potential as a strategy for reducing vehicle travel. It requires no new capital investment since the cars are already available. It can offer many amenities that transit cannot, such as door-to-door service. Finally, the cost savings are easily perceived by the individual riders.				
Toll Reduction for Carpools	One means of encouraging carpools is to reduce or eliminate the tolls on bridges or other toll facilities. Currently, the trans-bay bridges charge no tolls for carpools during peak hours. The Golden Gate Bridge also allows free passage of carpools.	Negligible		MTC staff judgment	Virtually all bridges now offer free passage to carpools during peak periods. Very little could be done to expand this measure, so it was eliminated during the screening process.

*The effectiveness of these measures was not estimated separately for the year 2000. They were combined with the compact development strategy for evaluation.

Table 4. Options Considered But Not Included in the Plan (Development and Land Use Management)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATES	COMMENTS AND SCREENING RATIONALE
		1985	2000		
General Policy: Alter regionwide development patterns to reduce automobile travel by means of local and regional policies on land use and urban services.	See Specific Policies and Actions below	Not estimated	24	ABAG land use and MTC transportation models	The reductions in emissions are based on a total regional population of 5.4 million. If the population were at the higher range projected (6.1 million), the emission reductions shown would be higher, but so would the total from which the reductions would be subtracted. The EMTF deleted the general policy and its policies and actions.

POLICY A - Extend new development only to those locations with existing sewer and water service or sewer and water service committed in capital improvement programs.

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| Action 1 - Local Agency Formation Commissions (LAFCOs) adopt city and special district spheres of influence throughout the region as soon as possible. | Action 2 - LAFCOs adopt the "urban service area" concept for defining urban service commitments and projecting urban land needs for 5, 10 and 20 year periods. | Action 3 - LAFCOs approve annexations and formation of cities and special districts consistent with Action 2 findings on urban service commitments and urban land needs. | Action 4 - Counties and cities enact non-urban zoning outside urban service areas. |
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Action 5 - Counties and cities enact temporary moratoria on urban zoning and subdivisions outside urban service areas pending the enforcement of non-urban zoning in such areas.

POLICY B - Restrict development outside urban service areas in areas of critical environmental concern (environmental resources, hazards or amenities).

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| Action 6 - Counties and cities enact agricultural zoning or large-lot rural residential zoning (generally one dwelling unit per 40 acre minimum lot size). | Action 7 - Counties and cities initiate, continue or expand programs under the California Land Conservation Act (Williamson Act), the Open Space Easement Act of 1974 and the Z'berg-Warren-Keene-Collier Forest Taxation Reform Act of 1976 outside urban service areas. | Action 8 - Counties and cities establish programs of public land management including acquisition, purchase/leaseback, purchase/transfer of development rights, etc.) for locations outside urban service areas. |
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POLICY C - Develop unimproved land within urban service areas where urban services exist or are committed in capital improvement programs.

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| Action 9 - ABAG, counties, cities and LAFCOs establish "early warning" inter-agency information exchange programs concerning urban service facility plans at the earliest stages of project planning. | Action 10 - ABAG, counties, cities and LAFCOs expedite plan or project reviews where early information on facilities has been provided, under Action 9. | Action 11 - Counties and cities initiate rezoning and permit preference procedures in locations with existing but unused service capacities (with emphasis on water, sewer, transportation and school services). |
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Table 14. Options Considered But Not Included in the Plan (Development and Land Use Management)

EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)					
RECOMMENDATION	DESCRIPTION	1985	2000	BASIS FOR ESTIMATES	COMMENTS AND SCREENING RATIONALE
POLICY D - Complete, as soon as possible, all needed sewer, water or transportation service improvements within adopted urban service areas.					
Action 12 - LAFCOs review all city, county, or special district sewer, water, or transportation service capital improvement programs and report on priority needs within each urban service area.	Action 13 - ABAG review sewer, water and transportation needs within all urban service areas to determine regionwide priorities among such service needs.			Action 14 - ABAG favorably review applications for State/ Federal financial assistance from agencies lacking service capacity within urban service areas, where other existing or committed services have been found by the LAFCO to be capable of accommodating additional development.	
POLICY E - Improve highway, street, road and transit systems consistent with local actions to stage land development.					
Action 15 - Counties and cities enact planning and zoning regulations to stage land development consistent with the scheduling of urban services (including but not limited to "development sequence zoning", "tiered zoning districts", development timing permits, etc.).	Action 16 - Caltrans, MTC, counties, cities, and special districts plan, program, fund and construct highway, street, road and transit improvements consistent with local action to stage land development.				
POLICY F - Increase housing and job opportunities in existing urbanized areas by encouraging public and private rebuilding into compatibly mixed commercial, industrial and residential land uses.					
Action 17 - Counties and cities initiate and/or expand housing conservation programs in existing urbanized areas.	Action 18 - Counties and cities initiate and/or expand commercial and industrial development and redevelopment in existing urbanized areas.			Action 19 - Counties, cities, and special districts initiate and/or expand incentives to public and private redevelopment in urbanized areas. Emphasis would be on sewer and water facilities, and extensive transit service improvements, but should also include educational and cultural facilities and public safety service improvements where appropriate.	Action 20 - ABAG, counties and cities analyze possible local revenue reforms to provide adequate financial resources to carry out Action 19.
Action 21 - ABAG support State legislation to provide local governments with adequate fiscal resources to carry out Action 19.	Action 22 - ABAG oppose Federal and State legislation that would hamper the ability of local governments to carry out rebuilding programs to increase job and housing opportunities in existing urbanized areas.				

Table 14 Options Considered But Not Included in the Plan (Development and Land Use Management)

RECOMMENDATION	DESCRIPTION	EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATES	COMMENTS AND SCREENING RATIONALE
		1985	2000		
POLICY G - Encourage "infill" development of bypassed vacant land within urban service areas.					
Action 23 - Counties and cities undertake planning studies to inventory bypassed land, identify development problems, and resolve questions of best potential use.	Action 24 - Counties and cities adopt necessary changes in zoning and permit procedures to facilitate development of bypassed parcels affected by special conditions.			Action 25 - Service agencies design sewer, water and transportation systems to improve accessibility and service ability of bypassed vacant land in existing urban communities.	
POLICY H - Develop at higher densities within service areas where existing or committed urban service capacities, including transit, can support the higher densities.					
Action 26 - In urban service areas with adequate sewer, water and transit capacities, counties and cities rezone appropriate locations to permit higher densities.	Action 27 - Counties and cities enact ordinances (such as those for planned unit development or cluster zoning) to foster higher densities on appropriate sites.				
POLICY I - Limit development of land within urban service areas where soil, slope, or other conditions can support only low-density development.					
Action 28 - Counties, cities and special districts deny primary urban services to these locations by excluding them from capital improvement programs and design of service systems, and by enactment of hookup moratoria, etc.	Action 29 - Counties, cities, and special districts establish programs of public land management (including but not limited to public land acquisition, purchase/transfer of development rights, purchase/leaseback, etc.) to maintain appropriate sites in open uses.				
POLICY J - Improve the balance of jobs and housing in jurisdictions throughout the region to reduce the necessity for long distance home-to-job travel.					
Action 30 - Cities and counties adopt programs to increase local employment opportunities if a substantial proportion of their residents work elsewhere.	Action 31 - Cities and counties adopt programs to increase local housing opportunities in a price range suitable for their work forces if a substantial proportion of their work forces live elsewhere.			Action 32 - ABAG conduct A-95 and EIR reviews to support local government to improve the balance of jobs and housing in communities throughout the region.	Action 33 - ABAG support State and Federal funding allocations for facilities and programs offering incentives to economic development or housing development in appropriate jurisdictions.
POLICY K - Mix residential/commercial and industrial development in communities throughout the bay region.					
Action 34 - Counties and cities revise zoning ordinances to allow compatible mixtures of land uses with adequate design or performance standards (including planned unit developments, performance standard zoning, etc.).	Action 35 - Counties and cities expand application of conditional use permits where appropriate.				

Table 14. Options Considered But Not Included in the Plan (Development and Land Use Management)

		EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)		BASIS FOR ESTIMATES	COMMENTS AND SCREENING RATIONALE
RECOMMENDATION	DESCRIPTION	1985	2000		
POLICY L - Discourage new large-scale land development projects that are exclusively commercial, industrial or residential, unless such projects clearly demonstrate that they improve the overall balance of jobs and housing in that city, county, or subregion.					
Action 36 - Counties, cities and LAFCOs deny incorporation or annexation of large-scale development proposals that are exclusively commercial, industrial or residential, unless such incorporation or annexation can be shown to improve the overall balance of jobs and housing in the city, county or subregion.	Action 37 - MTC, the California Department of Transportation and transportation districts deny regional transportation system access or extension to proposed large-scale land development projects that are exclusively commercial, industrial or residential unless such transportation actions can be shown to improve the overall balance of jobs and housing in the city, county or subregion.				
POLICY M - Fund new wastewater and transportation facilities only after areas serviced have taken actions to carry out actions of this plan.					
Action 38 - The State Water Resources Control Board and the Environmental Protection Agency require applicants for wastewater facilities under Section 201 of the Federal Water Pollution Control Act to demonstrate, prior to construction funding, that specific actions (including but not limited to land development regulations, urban service commitments, etc.) have been taken by affected jurisdictions to carry out actions of this plan.	Action 39 - The U.S. Department of Transportation, the California Transportation Commission, the California Department of Transportation and the Metropolitan Transportation Commission require applicants for transportation improvement grants to demonstrate prior to funding for acquisition and construction that specific actions (including but not limited to land development regulations, urban service commitments, etc.) have been taken by affected jurisdictions to carry out actions of this plan.				
POLICY N - Review development proposals for air quality effects and consistency with compact development recommendations in the plan (indirect source review)					
Action 40 - ABAG, BAAPCD and MTC adopt memoranda of understanding and procedures for prompt and thorough joint review of significant development proposals. Review would be conducted for proposals (such as shopping centers, industrial parks, office complexes, etc.) where significant air pollution could result from the project's generation of auto traffic.	Action 41 - BAAPCD adopt permit procedures for application to indirect sources.		Action 42 - ABAG encourage and support local government efforts to determine direct and indirect effects on air quality in making local land use decisions. Such support shall include technical assistance and analysis.		Action 43 - ABAG encourage and support local government efforts to reduce adverse effects of development proposals on air quality, including but not limited to assistance in identifying and implementing mitigation measures for adverse impacts of municipal wastewater facilities and transportation improvement programs.

Table 14. Options Considered But Not Included in the Plan (Development and Land Use Management)

		EST. HYDROCARBON EMISSION REDUCTIONS (Tons/Day)			
RECOMMENDATION	DESCRIPTION	1985	2000	BASIS FOR ESTIMATES	COMMENTS AND SCREENING RATIONALE
POLICY O - Adopt financial programs to support local and regional agency actions and private sector development actions consistent with policies in this chapter to reduce home-to-work distance and auto dependency.					
Action 44 - ABAG, counties and cities support State and Federal legislation to provide subventions and other fiscal assistance to cities and counties carrying out development policies to achieve air quality standards.	Action 45 - ABAG, counties and cities support State and Federal legislation providing tax incentives to the private sector for rebuilding and development within existing urbanized areas.			Action 46 - ABAG, counties and cities support State and Federal legislation providing financial support to local and regional agencies for carrying out development management policies and reviews to achieve air quality standards, especially to mitigate adverse impacts on low- and moderate-income households.	
POLICY P - Adopt a coordinated regionwide program for carrying out actions for attainment and maintenance of air quality standards through development and land use management actions by cities, counties, special districts, ABAG, BAAPCD, MTC, LAFCOs and other appropriate local and regional agencies.					
Action 47 - ABAG identify, within six months of General Assembly adoption of an initial air quality maintenance plan, which implementing actions are being carried out by local and regional agencies.	Action 48 - ABAG include, in each annual revision of the AQMP, agreements reached among local and regional agencies for carrying out land use and development management actions included in the initial AQMP.			Action 49 - ABAG include, in each annual revision of the AQMP, an identification of actions not being carried out by all appropriate agencies, and which actions are to be carried out by appropriate agencies by the next annual revision of the AQMP.	

Section-F

CONTROL STRATEGY ANALYSIS

The effectiveness of alternative control strategies in improving air quality was analyzed by using a series of computer-based models. Given the wide variety of human activities causing air pollution, projections of future air quality improvements must account for changes in these activities and in future air pollution control technologies. The models used are simply means of quantifying the effects of such changes on future air quality.

The forecasting system consists of four components:

- The ABAG Series 3 population, housing, employment and land use modeling system.
- The MTC travel demand models.
- The ABAG vehicle emissions model.
- The Livermore Regional Air Quality Model (LIRAQ) maintained by the BAAPCD.

These models were used in three distinct applications. First they were used to project future air quality assuming a continuation of existing regional growth trends and existing control programs. The results of this "baseline" projection were previously described.

Second, using the baseline projections as a starting point, an emissions sensitivity analysis was conducted to determine the range of emissions levels necessary to meet the federal oxidant standard. The purpose of this exercise was to provide information on the design of control strategies to meet the standard.

Third, a series of strategy cases were developed from the alternative control measures and tested through the modeling system for their effectiveness in improving air quality.

DETERMINING THE RANGE OF EMISSION REDUCTIONS NECESSARY TO MEET THE OXIDANT STANDARD

To define the emission reductions needed to meet the oxidant standard, the baseline emission levels were systematically reduced and analyzed by the LIRAQ model. (The testing of such emission changes is sometimes referred to as sensitivity analysis.) Thus the model was applied in successive iterations using a number of differing hydrocarbon and NO_x emissions assumptions until the emissions levels which will result in attainment of the standard were found. Additional analysis and example LIRAQ maps produced as part of this analysis can be found in Appendix C.

Table 15 summarizes the results of the sensitivity analysis. Each column of the table corresponds to a different combination of percent reductions in hydrocarbon and NO_x emissions. The sensitivity analysis was conducted using the 1985 baseline emissions as the starting point, indicated in the first column with zero emission reductions. The expected worst case regionwide high hour oxidant level for each set of emission levels is shown in the last row.

From the table, it is apparent that in order to meet the .08 ppm Federal oxidant standard, more than a 40 percent reduction in regionwide hydrocarbon emissions is required in 1985. A closer examination of the results indicates that a 43% reduction in hydrocarbon emissions is required. This translates to an allowable level of hydrocarbon emissions of 450 tons per day to attain the federal oxidant standard.

A second conclusion apparent from the table is that reducing oxides of nitrogen emissions results in higher oxidant levels than what would occur with hydrocarbon emission reductions alone. Laboratory studies of oxidant formation and empirical evidence from Los Angeles and elsewhere indicate that nitric oxide reacts to temporarily suppress ozone formation--the ozone formation is delayed. This means that the level of nitrogen oxides plays an important role in determining where and when the maximum ozone formation will occur. Table 16 summarizes what is known and what is suspected in regard to the effects of further control of NO_x emissions in the Bay Area. The LIRAQ sensitivity analysis indicates that further NO_x control will result in higher oxidant levels within the region than would occur with a "hydrocarbon only" control strategy. On the other hand, by not controlling nitrogen oxides, it is suspected that the oxidant problem of the Bay Area may be transported to a neighboring airshed (e.g., Sacramento or Monterey). The implications to be drawn are that hydrocarbons should be stringently controlled and that care should be exercised in deciding how much control of oxides of nitrogen emissions is appropriate.

Table 15. LIRAQ Emission Sensitivity Analysis Results

% Reduction HC	0	20	40	60	80	40	80
% Reduction NO	0	0	0	0	0	20	40
Expected worst-case regionwide high hour ozone (ppm)	.19	.14	.08*	.07	.06	.11	.06

*This value was rounded off from an original value of .0846 ppm.

Assumptions: 1) 1985 Baseline Emission Inventory
2) July 26, 1973 Prototype Meteorology

TABLE 16. Summary of Oxides of Nitrogen (NO_x) Control Issue

THE IMPACTS OF ADDITIONAL NO _x CONTROLS		THE IMPACTS OF <u>NO</u> ADDITIONAL NO _x CONTROLS	
<u>OXIDANT AIR QUALITY</u>		<u>OXIDANT AIR QUALITY</u>	
<u>Within the Bay Area</u>	<u>Outside the Bay Area</u>	<u>Within the Bay Area</u>	<u>Outside the Bay Area</u>
LIRAQ analysis indicates that higher levels of oxidant occur with NO _x controls in the proposed comprehensive strategy.	It is <u>suspected</u> that downwind areas where transport may contribute to existing oxidant problems would be improved.	LIRAQ analysis indicates that lower levels of oxidant occur with <u>no</u> NO _x controls in the proposed comprehensive strategy.	It is <u>suspected</u> that downwind areas where transport may contribute to existing problems would experience <u>worse</u> oxidant air quality.
<u>NITROGEN DIOXIDE (NO₂) AIR QUALITY</u>		<u>NITROGEN DIOXIDE (NO₂) AIR QUALITY</u>	
<u>Within the Bay Area</u>	<u>Outside the Bay Area</u>	<u>Within the Bay Area</u>	<u>Outside the Bay Area</u>
May reduce NO ₂ violations if appropriate controls can be identified, e.g., stationary vs. mobile and ground level vs. elevated emissions.	Not of concern (no NO ₂ violations are recorded in neighboring air basins).	NO _x emissions are projected to be relatively constant between 1975-2000. However, the relative contributions from mobile sources and industry change substantially. NO ₂ violations may decrease as the motor vehicle NO _x emissions decrease by 2000.	Not of concern (no NO ₂ violations are recorded in neighboring air basins).

SUMMARY OF THE CONTROL STRATEGIES TESTED

Three control strategies were developed and tested with the modeling system. Each of these strategies were tested for their short term (1985) and long term (2000) effectiveness. The strategies are composed of alternative control measures considered to be the most effective and implementable. These strategies are summarized in Table 17.

Figure 19 summarizes how the land use, transportation, and technological emission controls were input to the modeling system previously described. From the inventory of alternative control measures, short and long term technological improvements were developed and their effects in reducing stationary and mobile source emissions computed. Similarly, the effects of land use and transportation control measures were analyzed directly by the ABAG and MTC models. These changes in the ABAG and MTC models were then translated into emission changes. Emission inventories were reconstructed based on the control measures and the resulting air quality projected by LIRAQ. The short and long term comprehensive strategies were evaluated by making appropriate modifications to each of the models in the system as shown.

The main results of the strategy analysis are summarized in Table 18. The table indicates that substantial improvements in air quality can be made through the use of technology. It also indicates that technology alone will not be sufficient to meet the .08 ppm Federal oxidant standard. The transportation and land use management strategy, although relatively ineffective in the short term, is shown to become increasingly effective with time. The primary value of the transportation and land use management strategy is that it helps in maintaining the air quality improvements achieved through the application of technology. Under the maximum technology strategy, air quality deteriorates significantly between 1985 and 2000 despite technological advances. The comprehensive strategy reduces this deterioration, but is still not enough to meet the Federal oxidant standard.

As previously discussed, the Federal oxidant standard is a one hour standard, not to be exceeded more than once per year. Table 18 indicates that if a Comprehensive strategy is implemented, the number of times the standard would be exceeded drops to approximately 3 in 1985 and 11 in the year 2000. These estimates are necessarily approximate due to the natural variation in meteorological conditions from year to year. The California standard for oxidants, at .10 ppm for one hour, would be met in 1985 under a comprehensive strategy, but would be violated in the year 2000. Figures 20-26 are examples of LIRAQ results for each of the strategy cases summarized in Table 18.

An additional analysis was conducted to test the effects of a comprehensive strategy on the three northernmost counties in the region--Napa, Sonoma, and Solano. A comparison of expected oxidant levels on the LIRAQ prototype day in these counties is presented in Table 19 for both baseline conditions and under a comprehensive strategy. The table clearly shows a substantial improvement in oxidant levels will

Table 17 Summary of Control Strategies Tested

MAXIMUM TECHNOLOGY STRATEGY

- Use paints and other coatings that are water based and/or have a high solids content.
- Use closed systems for storage and transfer of organic liquids.
- Use best available control technology (BACT) on new and existing sources of hydrocarbon emissions.
- Adopt more stringent vehicle (light & heavy duty) exhaust emission standards.
- Implement mandatory annual inspection and maintenance program for light and heavy duty vehicles.
- Require exhaust control devices on existing heavy duty gasoline trucks.

TRANSPORTATION AND LAND USE
MANAGEMENT STRATEGY

- Increase tolls on bridges.
- Implement regional parking strategy to discourage private auto use and encourage high-occupancy auto use
 - parking tax
 - preferential parking for carpools, vanpools
- Provide additional transit service.
- Increase bus/carpool lanes and ramp metering.
- Implement an auto control zone in San Francisco central business district to reduce traffic.
- Provide more ride sharing services such as jitneys and vanpools.
- Develop more extensive bicycle systems.
- Achieve more compact development throughout the region by the year 2000.

COMPREHENSIVE STRATEGY

- By 1985, the comprehensive strategy includes: all of the technological control measures except for more stringent vehicle exhaust emission standards; and all of the land use/transportation measures. The effects of compact development were not included in the analysis for 1985 since the short time frame was insufficient for achieving significant results.
- By 2000, the comprehensive strategy includes: all of the technological control measures except for the exhaust control devices on existing heavy duty gasoline trucks (this measure provides short term benefits only); and all of the land use/transportation measures.

Figure 19

Control strategy testing with the AQMP Modeling System

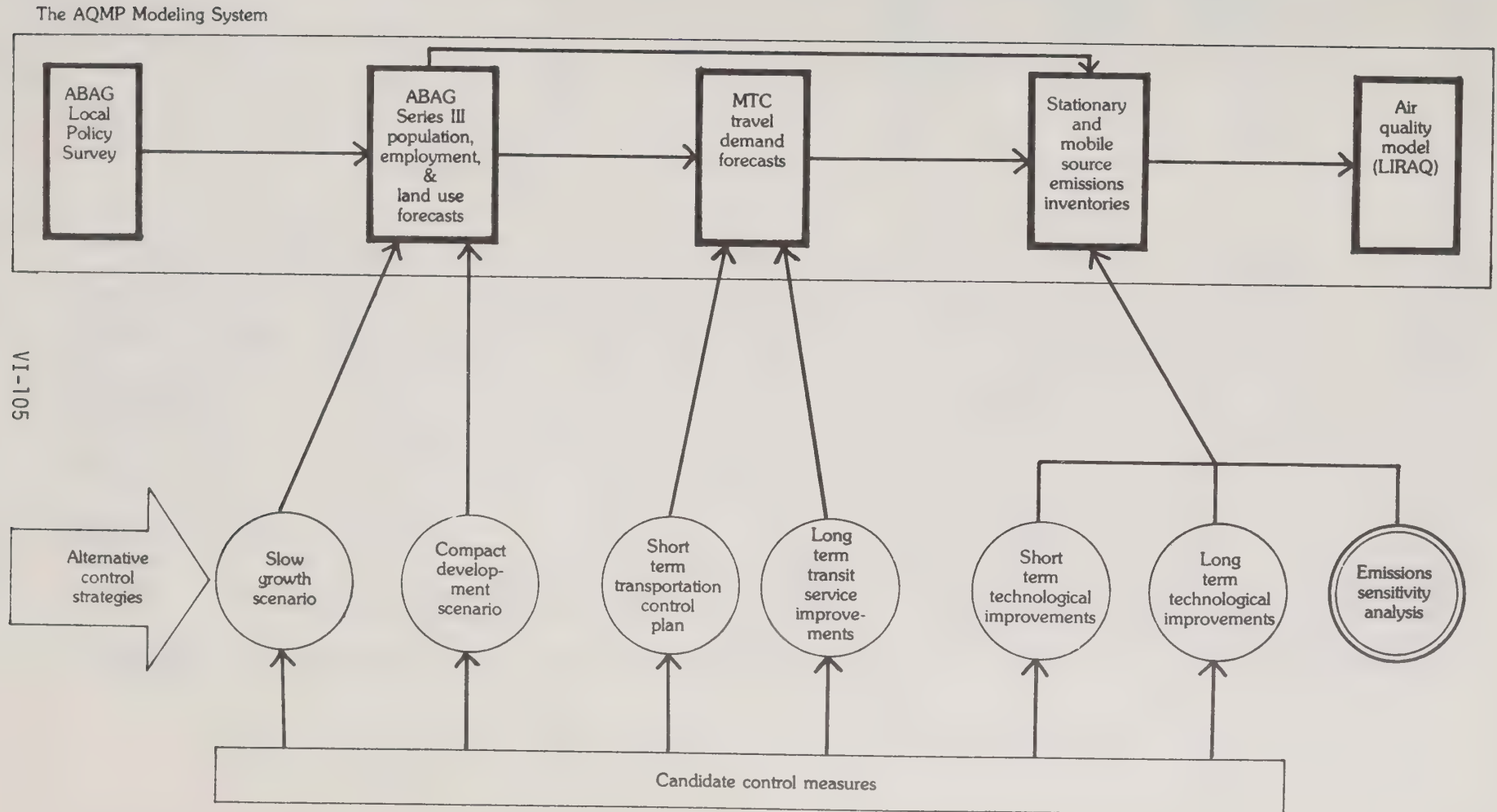


Table 18. Effectiveness of Alternative Control Strategies

Strategy	1985			2000		
	Hydrocarbon Emission Reduction Potential	Estimated Regionwide High Hour Oxidant Level (ppm)	Estimated No. of Annual Violations of the 1-Hour .08 ppm Federal Oxidant Standard	Hydrocarbon Emission Reduction Potential	Estimated Regionwide High Hour Oxidant Level (ppm)	Estimated No. of Annual Violations of the 1-Hour .08 ppm Federal Oxidant Standard
Baseline (do-nothing)*	(797 tons/day) emitted	.19ppm	130	(1,058 tons/day) emitted	.24ppm	275 hours
Maximum Technology	- 280 tons/day	.10ppm	3	- 441 tons/day	.13ppm	16 hours
Transportation and Land Use Management	- 7 tons/day	not estimated	-	- 84 tons/day with slow growth	.23ppm	220 hours
Comprehensive Strategy*	- 286 tons/day	.10ppm	3	- 513 tons/day with slow growth	.12ppm	11 hours

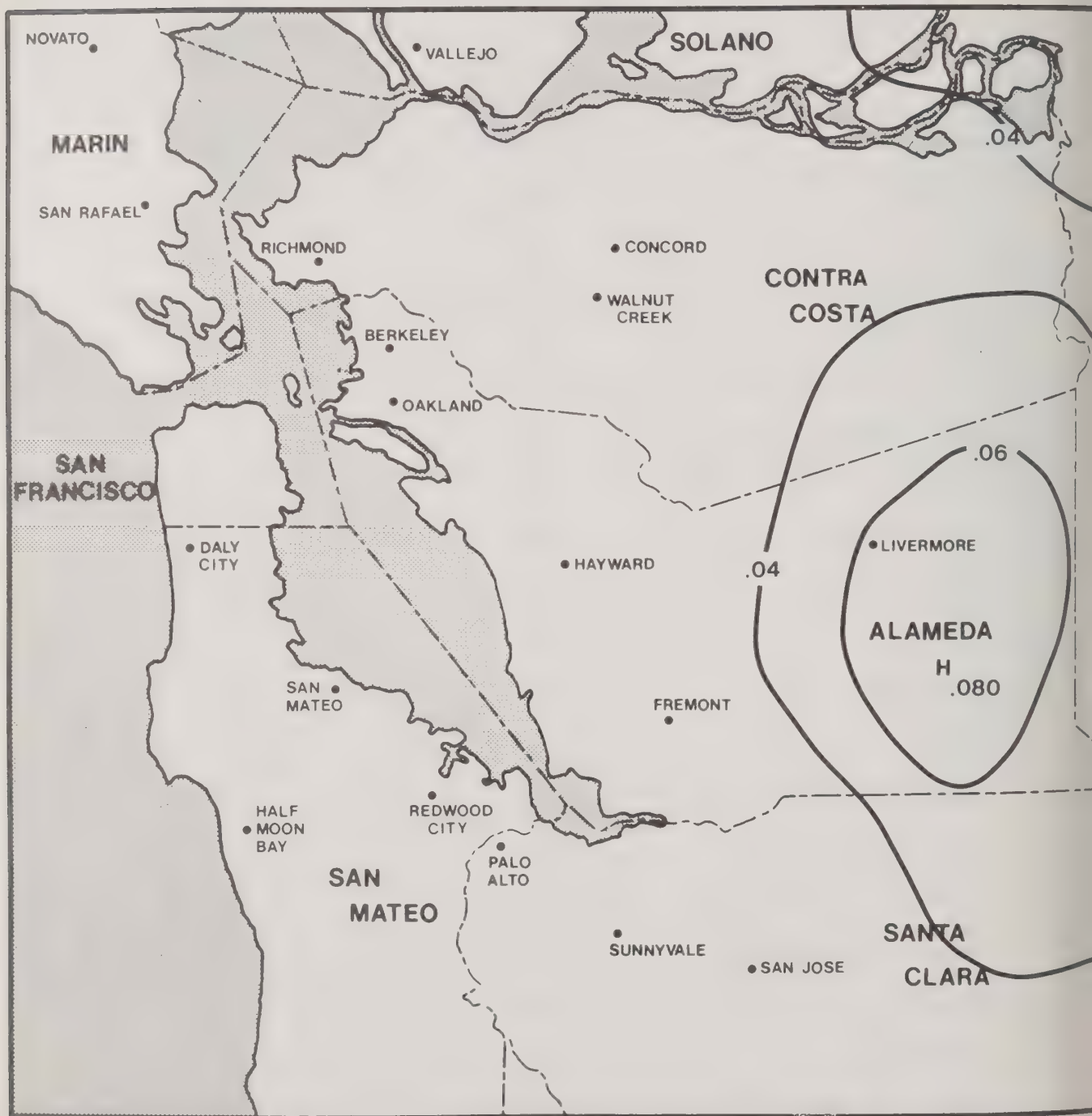
*Does not assume New Source Review Regulation.

Table 19. LIRAQ Baseline and Comprehensive Strategy
Analysis for the North Bay (2000)

	<u>Baseline</u>	<u>Comprehensive Strategy</u>
Location of North Regional High Hour Ozone North Regional High Hour (ppm)	12 km. ESE Travis AFB .08	14 km. ESE Travis AFB .06
Monitoring Station with Highest Ozone Ozone at Highest Station (ppm)	Napa Airport .07	Travis AFB .06

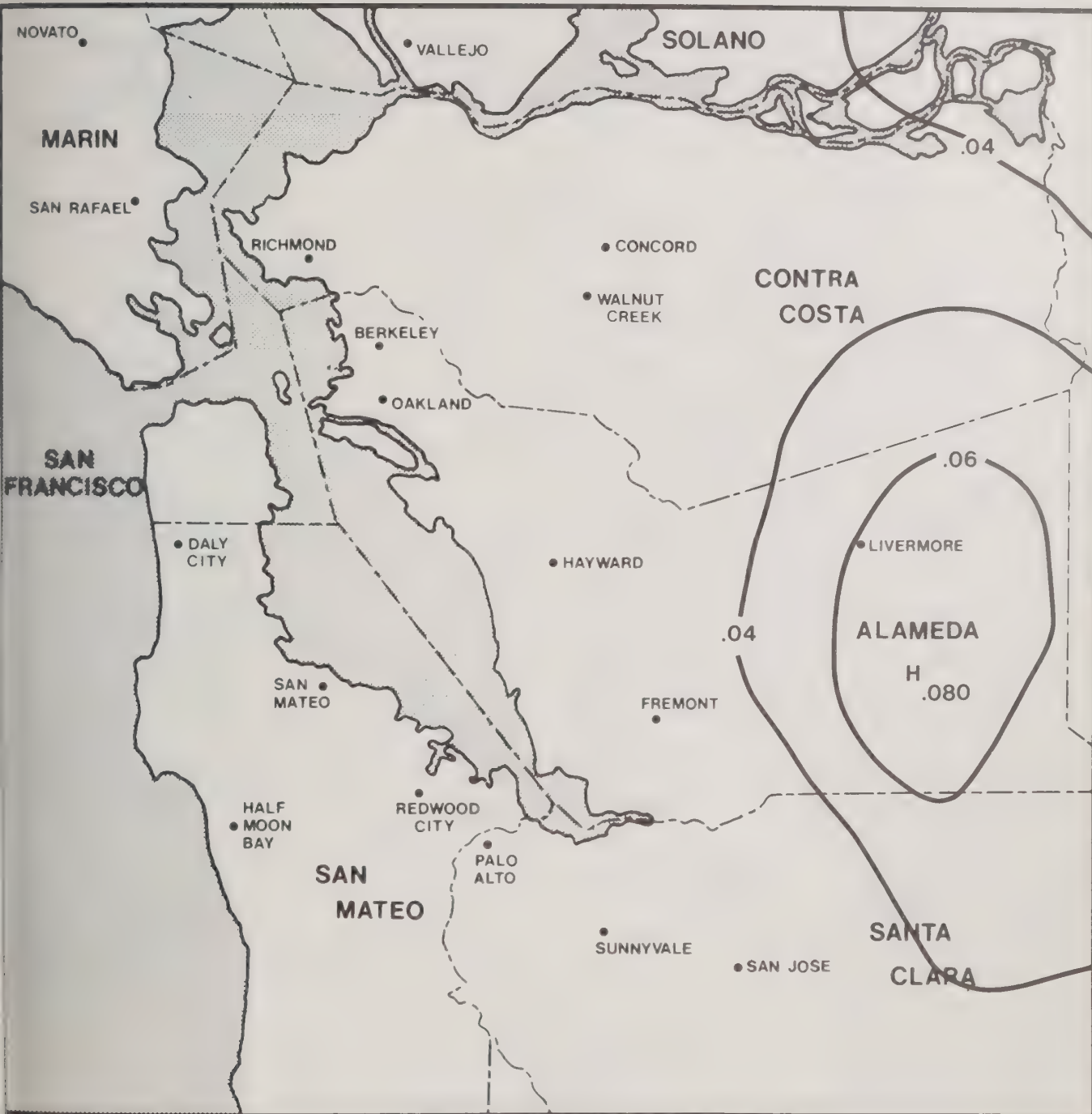
<u>Projected Ozone Maximum at Individual Stations (ppm)</u>		
San Francisco	.02	.02
Santa Rosa	.04	.04
San Rafael	.03	.03
Petaluma	.04	.03
Napa	.07	.05
Sonoma County Airport	.03	.03
Pittsburg	.05	.05
Hamilton Air Force Base	.03	.03
Napa County Airport	.07	.05
Concord	.06	.04
Richmond	.04	.03
Travis Air Force Base	.07	.06
Angel Island	.04	.03
Point Bonita	.04	.03
Fairfield	.06	.05

Figure 20. Example LIRAQ Results - 1985 Control Strategy Analysis
(Maximum Technological Improvements Only)



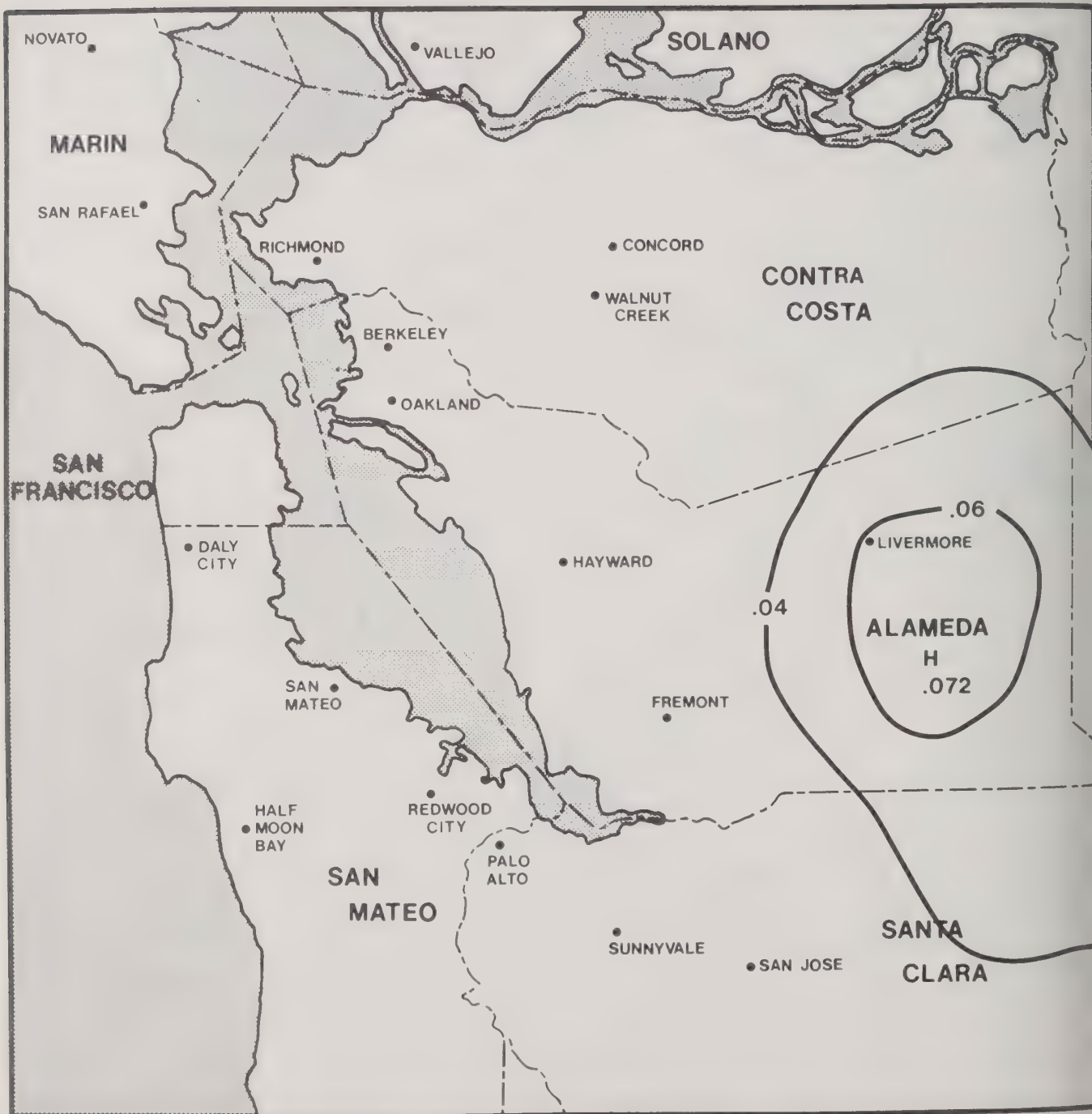
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 baseline inventory

Figure 21. Example LIRAQ Results - 1985 Control Strategy Analysis
(Comprehensive Strategy including Additional NO_x Controls)



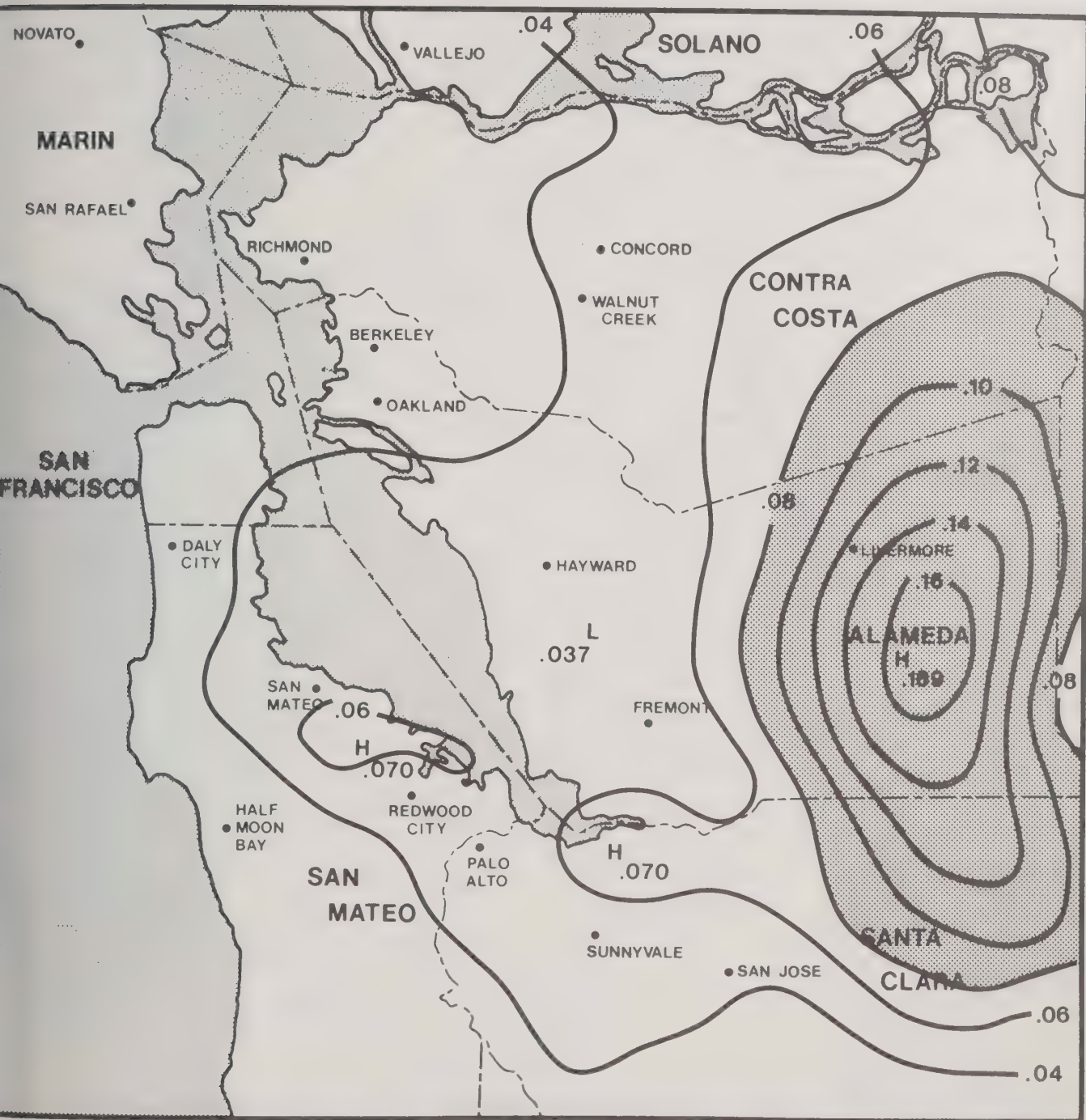
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 baseline inventory

Figure 22. Example LIRAQ Results - 1985 Control Strategy Analysis
(Comprehensive Strategy without Additional NO_x Controls)



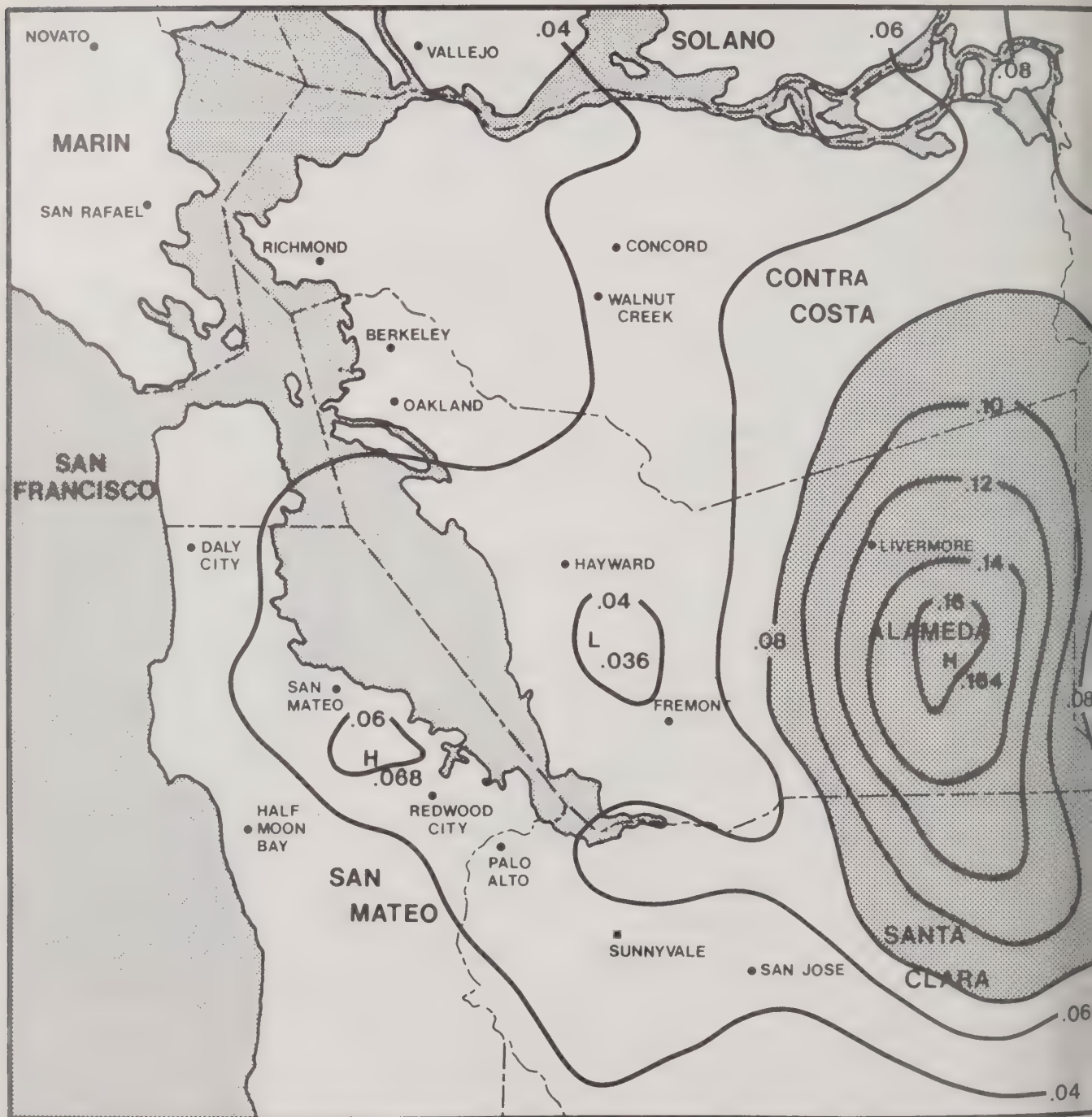
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 inventory

Figure 23. Example LIRAQ Results - 2000 Control Strategy Analysis
(Baseline Projection Assuming Slower Population Growth Rate)



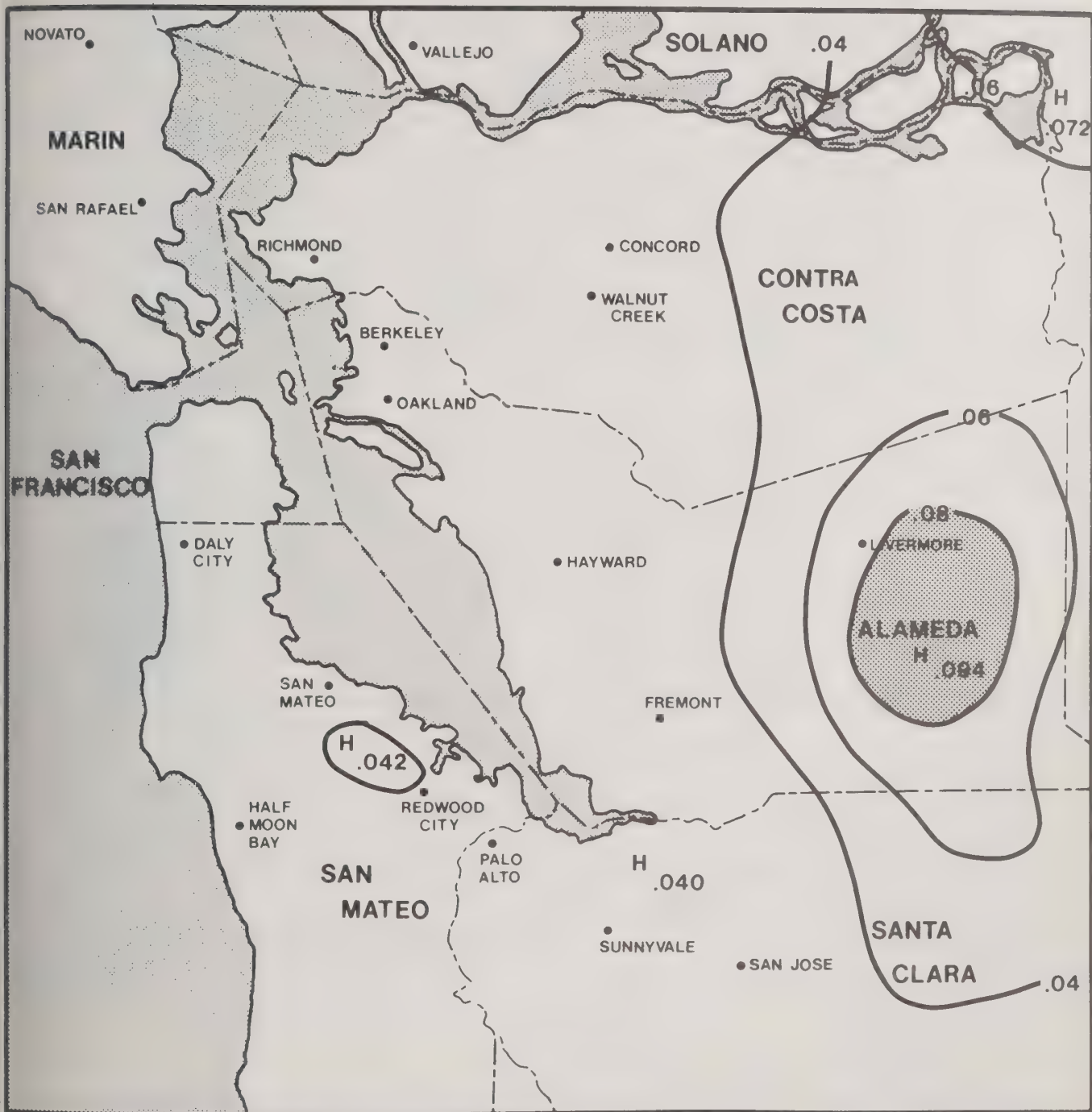
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
2) Values uncorrected for worst case conditions
3) Emission reductions taken from 2000 baseline inventory

Figure 24. Example LIRAQ Results - 2000 Control Strategy Analysis
(Transportation Controls and Land Use Management Only)



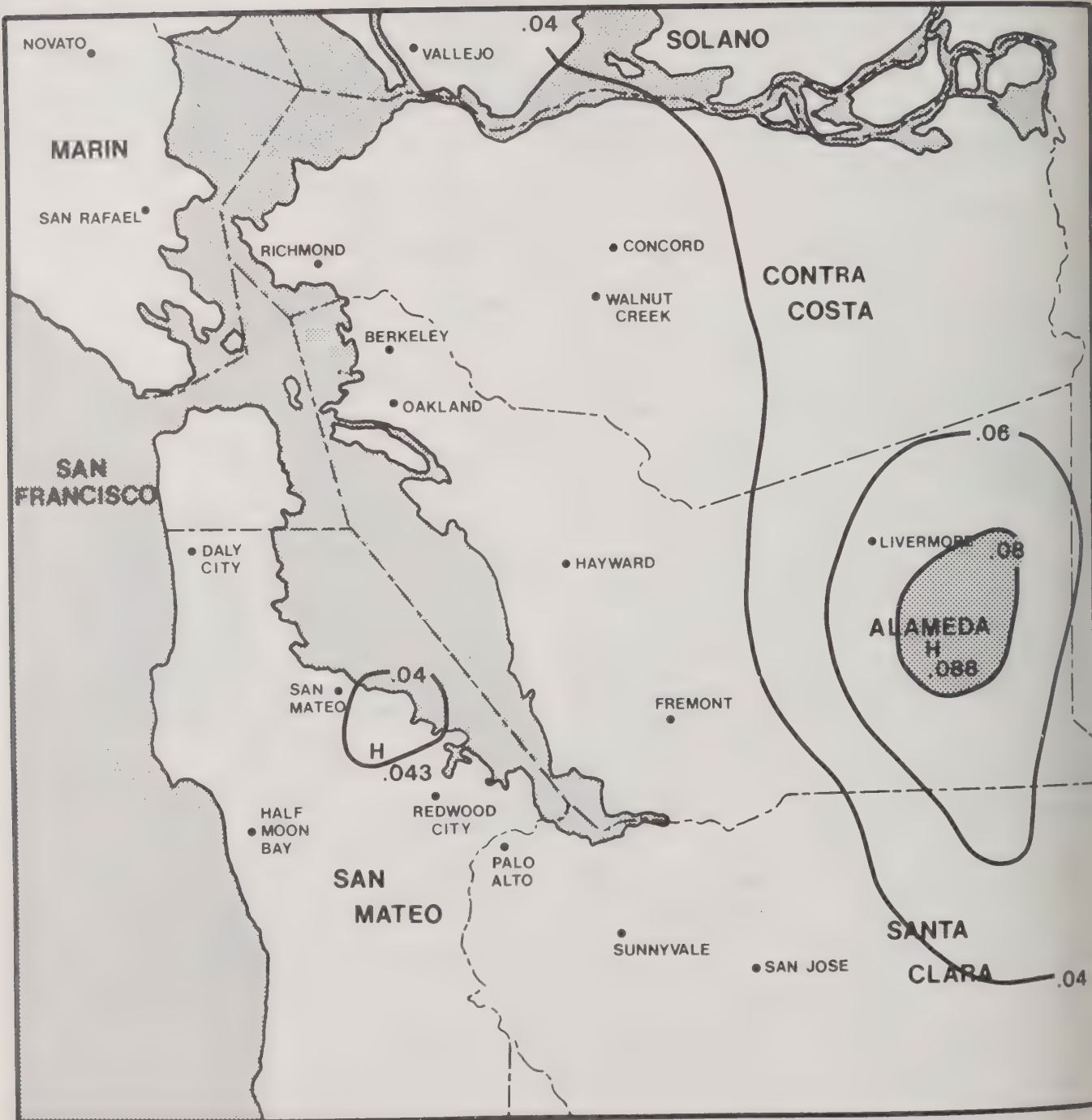
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
2) Values uncorrected for worst case conditions
3) Emission reductions taken from 2000 baseline inventory

Figure 25. Example LIRAQ Results - 2000 Control Strategy Analysis
(Maximum Technological Controls Only)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 2000 baseline inventory

Figure 26. Example LIRAQ Results - 2000 Control Strategy Analysis
(Comprehensive Strategy without Additional NO_x Controls)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
2) Values uncorrected for worst case conditions
3) Emission reductions taken from 2000 baseline inventory

occur in these northern counties under a comprehensive strategy. Based on the worst case estimates and number of expected violations for the region previously summarized in Table 18, it is expected that the oxidant standard will also be met in the northern counties under a comprehensive strategy.

MEETING THE .08 PPM OXIDANT STANDARD

The amount of hydrocarbon emissions allowable for the Bay Area to meet the oxidant standard is variable and influenced by a number of factors. As previously noted, the level of nitrogen oxides present strongly influences peak oxidant formation. Similarly, the spatial and temporal distribution of emissions is important. Based on the best information available, hydrocarbon emissions of less than 450 tons per day are required to meet the 0.08 ppm oxidant standard. In some instances, depending on nitrogen oxides present and how the hydrocarbons are distributed, substantially less hydrocarbon emissions would be needed in order to meet the standard.

The additional reductions in hydrocarbon emissions required to meet the oxidant standard in 1985 and 2000 are summarized in Table 21. By comparing the hydrocarbon emissions remaining after implementation of a comprehensive strategy to the allowable emissions level, the additional increments of emission reduction necessary to meet the standard may be estimated as shown in the table. Two estimates are given for the year 2000 to indicate the range of the additional reductions required depending on the population level reached in the region at that time.

Three alternatives have been identified for designing a strategy to meet the .08ppm oxidant standard:

- 1) Implement additional, less cost-effective controls on existing hydrocarbon sources.
- 2) Enforce restrictions on the growth of new sources and indirect sources of hydrocarbon emissions in the region.
- 3) Some combination of 1 and 2.

Table 20. Hydrocarbon Emission Reductions Required to Achieve the 0.08 PPM Photochemical Oxidant Standard

	<u>1985 (Tons/Day)</u>	<u>2000 (Tons/Day)</u>
Base Line Emissions	797	1058
Allowable Hydrocarbon Emissions ^a	<450	<450
Hydrocarbons Remaining After Implementing Comprehensive Strategy	511	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> 604^b ↓ >154^b </div> <div style="text-align: center;"> 545^c ↓ >95^c </div> </div>
Additional Hydrocarbon Reductions Needed to Meet Standard	>61	

^aVaries as a function of oxides of nitrogen emissions and the spatial and temporal distribution of all precursor emissions.

^bAssumes upper range of population forecast in Series 3 projections--6.1 million people in 2000.

^cAssumes lower range of population forecast in Series 3 projections-- 5.4 million people in 2000.

Additional Controls on Existing Sources

Table 21 summarizes additional control measures which could be applied to provide the final increment of control necessary to achieve the standard. These measures have not been analyzed to the same level of detail as the measures in a comprehensive strategy.

Table 21. Additional AQMP Control Measures for Existing Sources and Approximate Emission Reduction Potentials^a

	1985		2000	
	T/D	(%)	T/D	(%)
<u>Stationary Sources</u>				
● Lower Reid Vapor Pressure	15-30	2-4	20-35	2-3
● Ban Small Gasoline Engines (e.g., Lawnmowers)	10-15	1-2	20-30	2-3
<u>Mobile Sources</u>				
● Catalytic Converter Retrofit ('71-'74 LDV)	6	0.6	0	0
● Evaporative Retrofit (pre-1978)	4	0.4	0	0
<u>Transportation Controls</u>				
● Increased Gas Tax				
● Area License				
● Smog Charges				
● More Stringent Application of Previously-cited Transportation Controls	3-5	0.3-0.6	To be implemented with land use management measures	
<u>Other</u>				
● Gasoline Rationing	Variable impact depending on stringency of application and user groups affected. (A 100% rationing program could yield an additional 170 ton/day emission reduction by the year 2000.) Obviously, a very direct and potentially effective means of reducing hydrocarbon emissions.			
● Prohibiting Certain Organic Solvent Use	Variable impact depending on stringency of application. (A 100% prohibition could yield an additional 160 ton per day emission reduction by the year 2000.) This measure assumes going considerably beyond the use of water-based and high solids content solvents and BACT on organic solvent evaporation.			

^aAssumes prior implementation of a comprehensive strategy.

The lowered Reid Vapor Pressure of gasoline would produce the undesirable side effect of making vehicle engines difficult to operate in cold weather. If only small changes in vapor pressure are required, engine start-up and warm-up problems are minimal but the corresponding effectiveness of this measure is also minimal. This program has been studied in the past on a number of occasions. A current study being conducted by the American Petroleum Institute has concluded this proposal has very limited potential as an air pollution control measure. The technical feasibility of this measure is questionable. Therefore, it does not appear to be an attractive option for the AQMP.

A ban on the use and/or sale of gasoline engines would include lawnmowers, chain saws, small gasoline powered pumps and generators, etc. In some cases alternatives can be found such as electric lawn mowers; however, these alternatives have other undesirable characteristics in terms of inconvenience (small gasoline engines are ideal for use in situations where electrical power is not conveniently available). Enforcement of this measure could be difficult. This measure has many very obvious administrative and implementation obstacles associated with it. It is not considered to be an attractive option for the AQMP.

The catalyst and evaporative retrofit measures for light duty vehicles are marginally effective by 1985 and decrease in effectiveness as the retrofitted vehicles age and are eventually junked. Previous retrofit programs attempted by the California Air Resources Board have been unpopular, since there are no direct benefits to the vehicle owner. These programs have a very short term benefit and require rapid adoption and implementation to achieve their greatest potential. Given the many technical problems associated with retrofit programs in the past, these control measures are not considered to be attractive options for the AQMP.

The transportation controls listed can yield emission reductions shown if stringently applied. For example, a 300% increase in the cost of gasoline via a gasoline tax would yield an approximate 1 to 2 tons/day hydrocarbon emission reduction in 1985. A close assessment of any particular proposals is recommended prior to inclusion in the plan.

The measures listed as "other" can yield a range of emission reductions depending on how stringently they are applied. A 100% gasoline rationing program would yield an additional emission reduction of about 170 tons/day by the year 2000, assuming prior implementation of the Comprehensive Strategy. A 100% prohibition on organic solvent use in the region could yield an additional emission reduction of about 160 tons/day beyond the Comprehensive Strategy. The effectiveness of intermediate levels of stringency are difficult to estimate, but are expected to be somewhat less than proportional. The impacts of these measures are also variable depending on the stringency of their application. Again, because of the very obvious problems associated with implementing these measures, they do not appear to be attractive options for the plan.

Management of the Growth of New Sources and Indirect Sources

An alternative to additional control over existing sources is to manage the growth of new sources and indirect sources of emissions. New Source

Review (NSR) was excluded from the air quality evaluation of the comprehensive strategy for a number of reasons:

- NSR is of variable effectiveness, depending on how stringent the adopted rule is (e.g., offset provisions).
- The specific form of NSR appropriate and acceptable to regional, State, and Federal regulatory agencies has been and continues to be debated.
- It is more appropriate to compare the effectiveness of NSR with respect to other control programs using a common baseline forecast. Such a forecast should not already include an NSR assumption.

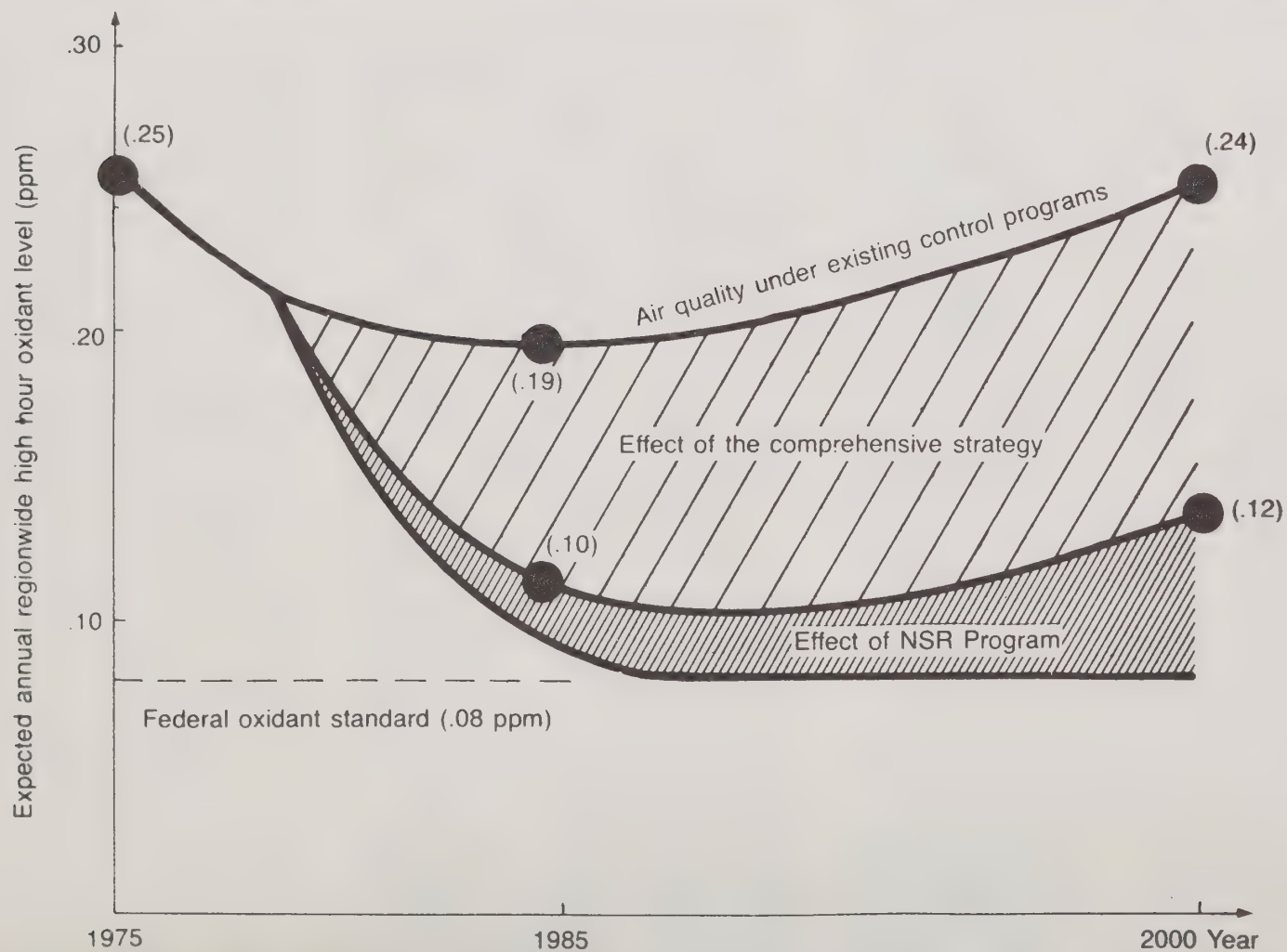
In considering alternatives for attaining and maintaining the oxidant standard after all reasonably available controls have been implemented, NSR is of interest. Its effectiveness can range from zero to a maximum of approximately 100 tons/day or more reduced by the year 2000. The specific level of effectiveness achieved depends on the number and type of sources subject to review, and the specific review criteria used for determining compliance.

New Source Review can ensure sufficient hydrocarbon emission reduction to allow attainment of the oxidant standard and continued maintenance thereafter. In addition, NSR regulations are such that they can provide some degree of flexibility. Initially strict regulations can be changed and relaxed somewhat after it has been demonstrated that the air quality standards can be attained and maintained in spite of such relaxation.

The potential role of NSR programs in relation to a comprehensive strategy and baseline air quality is illustrated in Figure 27. A comprehensive strategy is shown to provide the bulk of the air quality improvement between now and the year 2000, while the role of the NSR program could be to provide the incremental emission reduction (or prevention) necessary to attain and maintain the Federal oxidant standard. As a comprehensive strategy is made more stringent, restrictions on new source development can be made less stringent, and vice versa.

Figure-27

Relative roles of new source review and the comprehensive strategy in achieving and maintaining the Federal oxidant standard in the San Francisco Bay Region.



Section-G

PLAN RECOMMENDATIONS

The air quality maintenance plan contains a broad range of control programs for photochemical oxidants. It includes more controls on stationary sources of air pollutants and on motor vehicles. It also includes proposals for changes in the region's transportation systems.

The recommended application of improved technological controls to stationary sources and motor vehicles would produce the most substantial improvements in air quality. The transportation measures would act to reduce automobile traffic, a major source of air pollutant emissions. The stationary and mobile source controls, together with transportation measures and new source review programs, would ensure eventual attainment and long-term maintenance of the Federal oxidant standard.

In addition to other requirements, an acceptable air quality plan must demonstrate numerically that the oxidant standard would be achieved and maintained. The Environmental Management Task Force directed the staff to prepare such a plan, and to present options to measures in that plan. Approximately 100 measures were analyzed for their effectiveness in reducing emissions. The recommended plan is described in this section. Options for measures in the plan are described in Section E. As described in Chapter I, changes in the draft plan issued in December 1977 were made as a result of the public review and approval process. Certain measures presented in the draft were deleted from the plan adopted by the General Assembly of the Association of Bay Area Governments. These changes were made for a variety of reasons. Some measures were dropped because they were not considered effective or easily implemented. Other measures were deleted from the initial plan for additional study. The General Assembly specifically reserved for itself a right to make changes in all parts of the Environmental Management Plan during the continuing planning process, including the air quality plan. That process is in keeping with the policies and actions adopted in the air quality portion of the EMP.

The plan is diverse and flexible. The diversity is an advantage because it reduces the reliance on a single type of control. The plan is flexible because the new source review program can be applied with varying degrees of stringency as appropriate to meet the standard. Flexibility is desirable to accommodate uncertainty. In Section D, uncertainties relating to forecasting and the analytical tools used for the preparation

of the air quality plan are discussed. There are also uncertainties in estimating the effectiveness and costs of control programs that have not yet been implemented, and for which only limited information and experience are available.

The transportation actions would be implemented by local agencies and would demonstrate good faith efforts to meet and attain the oxidant standard as expeditiously as practicable. It is clear that the partnership of Federal-State-regional-local efforts called for by this plan to improve air quality would demonstrate reasonable progress toward attainment and could qualify the region for a five-year extension in meeting the Federal standard.

RECOMMENDATIONS

The plan recommendations are summarized in Table 22. For each action listed in the first column, subsequent columns of the table indicate the agencies responsible for implementing the action, the implementation schedule, costs, sources of financing, direct benefits in terms of emission reductions, and other environmental, institutional/financial, economic, and social impacts of the action.

Figure 28 highlights in graphic form the schedule for implementation of each of the plan recommendations. Most of the recommendations could be adopted by appropriate agencies within two years of plan approval. However, full implementation would realistically require several years beyond the adoption phase, particularly for the most significant programs such as the use of available control technology (ACT). It is therefore unlikely that the oxidant standard can be met in the Bay Area by 1982. The ultimate 1987 target year for attainment set by the 1977 Clean Air Act Amendments can be met through implementation of this plan.

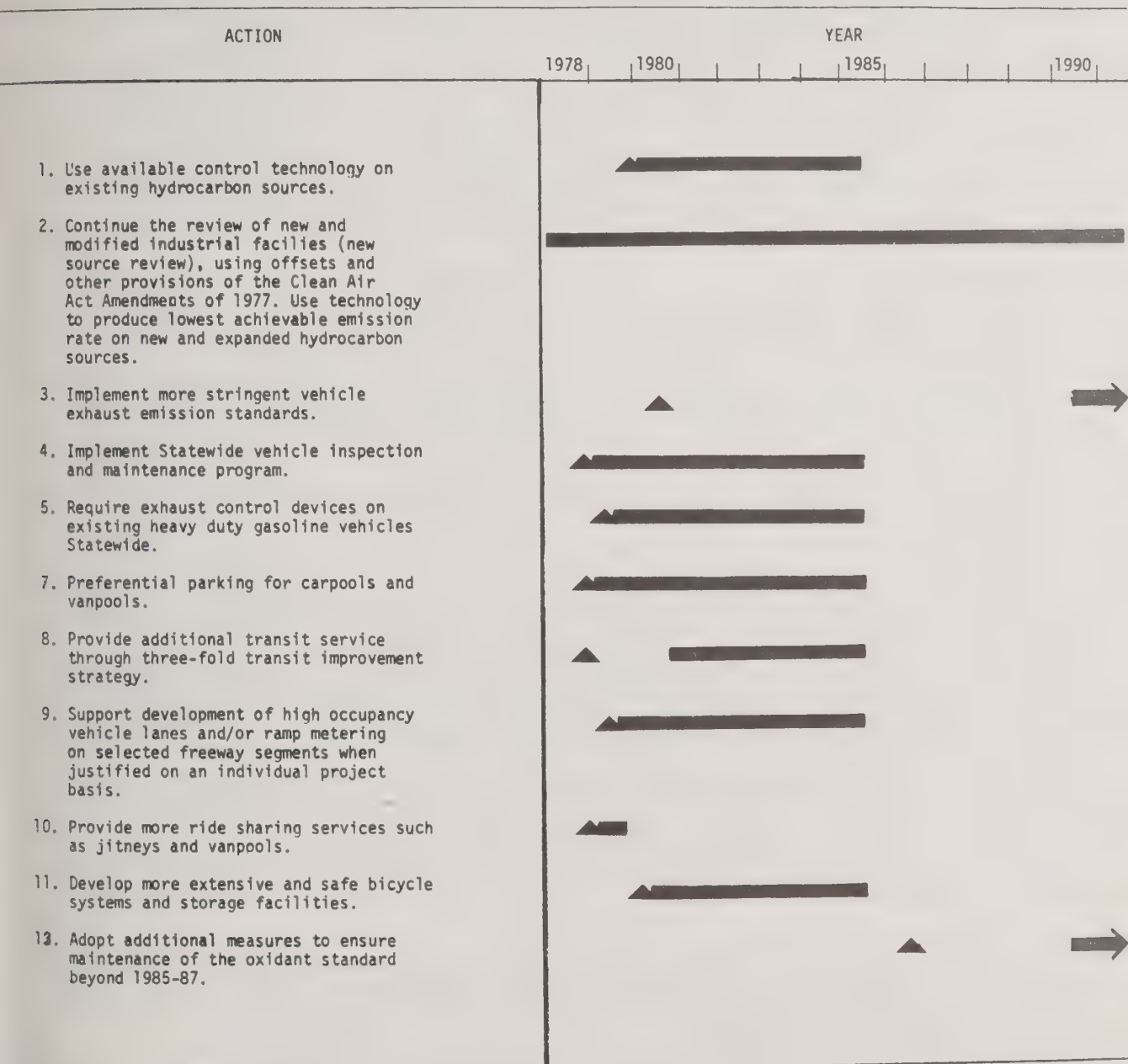
The following narrative provides background information for the recommended actions.

I. General Policy: Reduce Hydrocarbon Emissions from Stationary Sources

The actions necessary to implement this policy must focus on both existing and future sources of hydrocarbon emissions in the Bay Area. Heavy reliance is placed on requiring the use of advanced emission control technology for existing sources. New sources of emissions will face stringent review requirements before being allowed to locate in the region.

It is intended that the air quality plan adopted for the Bay Area facilitate a reasonable level of industrial and commercial growth while achieving reasonable further progress toward attainment of ambient air quality standards. The air quality plan provides that this be accomplished through continued review of new and modified industrial and commercial facilities (new source review) using offset and/or other provisions of the Clean Air Act Amendments of 1977 to allow for a reasonable level of growth. Currently the only means of allowing major industrial growth is the case-by-case offset provision of new source review regulations. However, it is too soon to determine whether this provision will in fact allow a reasonable level of industrial growth. Therefore, in the continuing planning process (described in Section J and Chapter VIII),

FIGURE 28. SCHEDULE FOR IMPLEMENTATION OF THE AIR QUALITY MAINTENANCE PLAN



adopt program/regulation



implementation

as emission reductions and economic impacts are monitored, alternative procedures for permitting industrial growth will be evaluated and considered for inclusion in updated versions of the air quality plan.

Action 1: Use available control technology on existing hydrocarbon sources, allowing a reasonable amortization schedule for air pollution control equipment. Available control technology means an emission limitation based on the maximum degree of reduction of hydrocarbons emitted from or which results from any emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such facility through application of available methods, systems and techniques. Technology for selected processes, which have been included in the projections of emission reductions, are as follows:

<u>Process</u>	<u>Technology</u>
Organic storage.....	Secondary seals
Tar pots.....	Loading door assembly
Paint spray booth.....	Incinerator or low-no solvent coatings
Architectural coating.....	Low solvent coatings
Dry cleaning	Closed system with solvent recovery
Cable tar coating.....	Incineration
Gasoline bulk storage.....	Floating roof or fixed roof & vapor recovery
Auto service station storage tanks...	Balanced system
Auto fill operations.....	Balance system

The legislation establishing the BAAPCD did not permit the BAAPCD to specify control equipment to be used in meeting control regulations and emission limitations. Therefore, until recently, all BAAPCD regulations were performance regulations. The regulation specified limits on the amount, concentration, or visible appearance of the emission; the means of complying with the regulation was the prerogative of the operator of the source.

More recently, State laws have been altered to remove the prohibition against specification of equipment thus allowing the BAAPCD to require the use of the most effective technology actually available and proven in use, not necessarily in the Bay Area. It does not include unproven theoretical devices.

An ACT rule would require that existing operations use specified air pollution control techniques, such techniques being specified by the BAAPCD. The rule could be adopted by the end of 1979, but five years should be allowed for full implementation.

Action 2: Continue the review of new and modified industrial facilities (new source review), using offsets and/or other provisions of the Clean Air Act Amendments of 1977 to allow for a reasonable level of growth consistent with the requirements of the act. Use technology to produce the lowest achievable emission rate (LAER), as defined by the Clean Air Act Amendments of 1977, on new and expanded hydrocarbon sources.

Since July of 1972 the BAAPCD has had in effect a permit rule (Division 13, Regulation 2) specifying the authority to deny a permit to construct (Section 1309) or to operate (Section 1310) if the new source will "interfere with the attainment or maintenance of any air quality standard adopted by the California Air Resources Board or the Environmental Protection Agency...."

Section 1311.2 of that same regulation specifies that a permit will not be denied if the emissions of each contaminant from a facility are significantly less than from the original facility. Thus a degree of offset is acknowledged, i.e., if emissions from existing operations are reduced by more than the emissions from a new operation, the new operation will be allowed. It is important to understand that Section 1311.2 is interpreted to mean that the reduction of existing emissions must be accomplished from facilities operated by the same owner, i.e., the owner of the proposed facility, and at the same location. Additionally, Section 1311.2 requires offset to be for the same pollutant type, e.g., SO₂ for SO₂, not carbon monoxide for hydrocarbons.

This action would retain the present BAAPCD permit rule with or without expansion of or modifications to the offset provisions. Depending on the success of all other air pollution controls recommended in this plan, the New Source Review rule would require:

- The prohibition of some new industries with significant emissions (for example, an industry that cannot meet the New Source Review criteria or could not obtain the designated emission offset).
- Increased cleanup from existing sources through offsets/negotiation, or in some cases prohibition of modifications proposed by existing sources

II. General Policy: Reduce Hydrocarbon Emissions from Motor Vehicles

The actions necessary to implement this policy change with time. Initially, effort would be focused on implementing exhaust controls on gasoline powered trucks and a program of mandatory vehicle inspection and maintenance for both autos and trucks. These programs will act to minimize emissions from existing vehicles. On a longer term basis, more stringent vehicle emission standards are recommended as new engine technologies become available for mass production. The mandatory inspection and maintenance program would still be necessary on a long term basis to ensure that the newer, cleaner vehicles being produced continue to perform at their design levels after they have been operated for some time.

Action 3: Implement more stringent vehicle (light duty and heavy duty) exhaust emission controls--approximately 50% reduction below 1977 prescribed levels.

Currently promulgated emissions standards for motor vehicles will achieve substantial emissions reductions from light and heavy duty vehicles in the period 1980-1985. These reductions, however, will eventually be offset by growth in vehicle population and vehicle miles traveled that is anticipated between 1985 and 2000. For example, in 1985, baseline motor vehicle hydrocarbon emissions are projected to be 213 tons per day. In 2000, the emissions increased to 267 tons per day.

The recommendation requires that the exhaust emission characteristics of vehicles manufactured after 1990 be reduced by:

- 50% from the ultimate levels promulgated under the 1970 Clean Air Act Amendments for light duty vehicles. The requirements (i.e. grams per mile standards) in the 1977 Amendments are approximately the same as the 1970 Clean Air Act.

- 50% from the ultimate 1983 Air Resources Board standards for medium and heavy duty vehicles.

The resultant emission standards would be:

	HC	grams/mile CO	NO _x
light duty	.20	1.70	.40
medium duty	.25	4.50	.15
heavy duty*	.25	12.50	4.5

Action 4: Implement Statewide inspection/maintenance program for light and heavy duty vehicles.

While automobile emissions can be controlled by a variety of basic engine modifications and exhaust treatment devices, the state of tune of the vehicle also affects emissions significantly, regardless of what emission standards the vehicle was originally designed to meet. For example, mis-firing spark plugs can increase unburned hydrocarbon emissions tenfold. An incorrectly adjusted idle air/fuel ratio can double carbon monoxide emissions. Defective emission control components can cause the emissions of late model cars to equal those of uncontrolled vehicles. A program for identification and repair of vehicles with excessive emissions caused by maladjusted or defective components has the potential to significantly reduce automotive emissions.

The recommendation requires inspection of all light duty automobiles starting in 1982 and the inspection of medium duty vehicles beginning in 1985. The inspections (which would take about five minutes) consists of: visual safety inspections, visual inspection of the emission control systems and exhaust smoke; automatic computer analysis of carbon monoxide and hydrocarbon exhaust gas emissions (could also include oxides of nitrogen, if loaded tests were performed), and an automatic printout of the inspection report comparing the emissions measured to acceptable limits for that particular model. If the vehicle fails the inspection it is required to be repaired by a certified mechanic and then be reinspected. If the vehicle cannot be repaired in order to meet the standard of performance for under a pre-established amount (e.g. \$75) then the vehicle owner may be given a waiver for that year. This would not relieve the vehicle owner from future year inspections.

Action 5: Require exhaust control devices on existing heavy duty gasoline vehicles Statewide.

The regulation of emission levels from heavy duty vehicles (over 6,000 pounds gross vehicle weight) has lagged behind efforts to control light duty vehicle emissions. The slower turnover rate for heavy duty vehicles means they remain in use for a longer time than light duty vehicles. Thus, even with emissions standards for heavy duty vehicles, some control program is needed to minimize emissions from in-use vehicles before they are replaced by newer and cleaner vehicles.

*grams brake horse power

The recommendation requires that all heavy duty gasoline (HDG) vehicles manufactured in 1971-1982 be retrofitted with a catalytic converter by 1985. Diesel vehicles are exempted because they emit relatively small amounts of hydrocarbons and because it is impractical to install a converter. Pre-1971 models are exempt because they require leaded gasoline (leaded gasoline contaminates the catalyst). Post-1982 vehicles are assumed to be equipped with catalysts in order to meet the 1982 emissions standards already adopted by the California Air Resources Board.

Action 6: Permit no further delays in implementing strict emission requirements on automobiles, provided, however, that if such delays are granted by either the California Air Resources Board or Congress, this region should be provided with extensions beyond the deadlines required by the Clean Air Act Amendments of 1977.

Since automobiles and other vehicles are a major contributor to hydrocarbon emissions, any delays granted in the implementation of emission standards will hamper the region's ability to attain and maintain the oxidant standard. If such delays are granted, it will be necessary to revise the deadlines of the Clean Air Act.

III. General Policy: Reduce Motor Vehicle Emissions Through Transportation Actions to Reduce Vehicle Use

The objectives of the transportation actions recommended are to encourage use of public transit and other high occupancy vehicle travel modes. At its March 22, 1978 meeting the Metropolitan Transportation Commission adopted guidelines with respect to the provisions of the air quality plan. The MTC statement is as follows:

"Guidelines

The Commission endorsed the following guidelines which are supported by existing Regional Transportation Plan (RTP) policies:

1. MTC will use its funding and project approval power to support compliance with the final land use plan as adopted by ABAG and included in the AQMP. (Note: No land use plan is included in the AQMP.)
2. MTC will continue to make air quality a major consideration in project funding decisions.
3. Because the impact of specific pricing control measures appears quite small, MTC will consider such control measures only under certain conditions:
 - a. When problems of social and economic inequities in the transportation system are minimized and adequate transportation alternatives exist.
 - b. When such pricing measures are necessary to insure that the entire transportation plan is feasible.
 - c. When such a measure is evaluated in detail and subjected to full scale public hearings.

4. MTC policy supports measures which improve or enhance alternatives to the automobile without penalizing those dependent on the auto. These alternatives include transit, carpooling and bicycle systems.
5. Existing MTC policy supports the concept of high occupancy vehicle lanes when they are found to be advisable on a project and location specific basis.
6. MTC, in applying these guidelines and in developing additional transportation measures to improve air quality, will undertake adequate analysis and provide for public review to assure that any proposal will achieve air quality objectives while remaining consistent with other RTP objectives.
7. MTC recommends a strategy of high density residential or commercial zoning around all BART stations and around all major fixed point transportation centers, where it would improve use of public transit without causing other major environmental problems. This proposal would support better utilization of the regional transportation systems. (Note: The Executive Board considered this suggestion, and decided not to include it in the AQMP recommended to the General Assembly.)"

Action 7: Preferential parking for carpools and vanpools.

Preferential parking would be provided to carpoolers by giving them (1) reduced parking charges in areas with paid parking, such as central business districts, or (b) a time savings in areas of free parking, such as large suburban employers.

Carpooling can be one of the more effective ways of improving the efficiency of the transportation systems, both from an air quality and operations viewpoint. However, people are frequently reluctant to carpool because of the time lost in picking up members.

The carpool parking incentives are modeled after a program that Caltrans is currently testing. State lots are leased to operators at a reduced rate on condition that (1) they only allow carpools to park, and (2) charge no more than \$10/month. Carpools sign up for a space and there is currently a waiting list.

The time incentive would work by having large employers set aside close-in parking for carpools. This would compensate for the time lost in the pick-up phases.

Action 8: Pursue a three-fold transit improvement strategy. (1) MTC, in cooperation with transit operators, will adopt service improvement objectives which can be financed by the existing commitment of resources to transit. Improved capacity, service, and ridership are contemplated. A measure of the improvement expected should be agreed to and committed to in the context of the RTP by October 1, 1978. (2) MTC will continue its efforts to identify the need for additional services (as it has, for example, in the elderly and handicapped program and more recently in the Minority Transportation Needs Assessment Project (MTNAP) and to pursue providing additional services as they are justified. A measure of the improvement expected will continue to be developed as these special needs are examined and as the demand for transit services expands generally. (3) During the commute hours all major transit systems in the Bay Area are at capacity. Any

substantial increase in ridership will be dependent upon increased Federal or State financial assistance. The amount of ridership increase is directly affected by the amount of increased State and Federal funding. Provision of additional transit capacity represents a positive transportation strategy. Thus the State and Federal governments are encouraged to provide necessary funding support for transit improvements to offset any air-quality deficiencies caused by deleting less desirable transportation control measures. Without this financial support, transit capacity cannot be significantly expanded.

The additional service would help make transit more competitive with respect to the auto by providing more coverage or better frequency. Existing funding services could not support this new burden. Additional revenues from Federal and State governments would be required.

The expansion program would be phased over 5 years, and would begin in 1980.

Action 9: Support development of high occupancy vehicle lanes and/or ramp metering on selected freeway segments when justified on an individual project basis.

Some form of preferential treatment (special lanes on the freeways and/or ramp metering with special lanes on ramps) could be given to buses and car-pools on the following freeway segments; for example:

- Route 580 from Route 24 to the Bay Bridge
- Route 80 from San Pablo Dam Road to the Bay Bridge
- Route 101 from the San Francisco Airport to the Route 280 Diamond Lane

Since these would require detailed planning, funding approval and construction, they would not be operational until 1985.

This measure is another incentive to induce commuters to take transit or to form carpools by saving them time. These particular example segments of freeway are frequently congested during peak hours and preferential treatment could result in significant time savings.

Action 10: Provide more ride sharing services such as jitneys and vanpools. Objectives need to be developed and monitored to gauge the desirable rate of expansion.

Currently, a carpool matching program, RIDES, is being administered by Caltrans. It is aimed at major employment centers, with participants solicited primarily by general advertising campaigns. This has been a successful program to date, but the AQMP proposal would intensify the effort. Increased employer participation would be sought for direct employee contact or adjustment to flexible working hours. Also, secondary employment centers could be served by tailoring campaigns to specific areas.

With respect to vanpools, the Golden Gate District is starting a demonstration program to initiate vanpools from Marin County. A program such as this could be expanded to the regional level. One proposal is for the non-stock, non-profit corporation to provide standardized minimum risk leases of vans to employers and employee groups meeting the criteria for such a program. Lease terms and specifications could be prearranged through a competitive bidding procedure.

Action 11: Develop more extensive and safe bicycle systems and storage facilities. Objectives need to be developed and monitored to gauge the desirable rate of expansion.

The system would be directed toward major employment centers, commercial centers, and transit terminals throughout the region. The paths would be painted on existing streets with approximately one-half mile intervals between parallel paths. Storage would comprise lockers, racks, and whatever special storage areas may be provided by the private sector. Initial planning for the measure would commence in 1978. The physical construction of the system would begin in 1980 and continue through 1985.

This measure has the potential to improve regionwide air quality by diverting both work and non-work trips of less than 2.5 miles to bicycles. Sunny and warm days, when the photochemical problem is most serious, are also the most conducive to bicycle riding. Emissions from cold starts and hot soaks will produce the majority of mobile emissions by 1985. Thus, even though bikes would not reduce vehicle miles traveled significantly, they will have a significant impact on emissions by reducing the number of trips.

Action 12: MTC is requested to consider the following action: "Complete construction of certain portions of State freeway systems in which there are now pollution-causing gaps."

If agreed to by MTC, a determination of where such pollution-causing gaps occur would be necessary. Any consideration of construction to eliminate them would be analyzed and assessed as a part of the Regional Transportation Plan. Actual construction would not proceed prior to project level planning/design actions taken by Caltrans.

IV. General Policy: Ensure maintenance of the oxidant standard beyond 1985-87.

Action 13: Adopt between 1985 and 1987, and implement in 1990 or thereafter, one or more of the following measures to ensure maintenance of the oxidant standard through the year 2000, subject to further evaluation of the measures during the continuing planning process:

1. Reduce hydrocarbon emissions from small gasoline engines.
2. Reduce hydrocarbon emissions from off-highway mobile sources
3. Implement more stringent vehicle exhaust emission controls--approximately 60-80% reduction below 1977 prescribed levels.
4. Provide additional transit

These actions are to maintain the oxidant standard beyond 1985-87. The Clean Air Act requires the AQMP to demonstrate the ability to meet established Federal air quality standards (in this case the Federal photochemical oxidant standard) and to maintain the standard following attainment. Because they are needed for long-term maintenance, responsible agency(s) action to adopt and implement these additional measures will not be necessary prior to 1985. The maintenance measures are identified for further analysis during the continuing planning process, with one or more of the measures to be adopted as necessary to ensure maintenance of the current Federal oxidant standard after 1985-87. Part of the analysis will include detailed assessment of the impacts of the substitute maintenance measures.

Measures 3 and 4 are self-explanatory. Measure 1 involves controls for small gasoline engines. Two major categories of engine equipment are involved. The lawnmower (lawn and garden equipment) category consists of push-type mowers, riding mowers, garden tractors, rototillers, golf carts, and miscellaneous lawn and garden implements. The miscellaneous utility engines category consists of small internal combustion engines in equipment such as chainsaws, generators, pumps, compressors (used in painting, sand-blasting, surface coating). Engines are either 2-stroke or 4-stroke, with the former being significantly dirtier. Emissions from 2-stroke engines may be up to seven times the emissions from a 4-stroke engine.

Measure 2 involves two major mobile source categories. The farm equipment category includes many types of farm equipment powered by internal combustion engines, but predominant is the farm tractor. The construction equipment category includes vehicles and other equipment used in construction and earth moving, mining and quarrying, and lumber industries and other miscellaneous equipment. Predominant units are tractors (wheeled and track laying); other types are scrapers, graders, loaders, motor generators and compressors. Power is of two types (gasoline and diesel) with the latter being more of an issue for NO_x , particulates and oxides of sulfur.

The four maintenance measures are estimated to reduce hydrocarbon emissions by 24 tons/day by the year 2000. This reduction is the current estimated tonnage reduction necessary to show long-term maintenance of the Federal photochemical oxidant standard.

A Final Note on Uncertainty and Its Relationship to the Continuing Planning Process

As has been pointed out elsewhere in this chapter, there are uncertainties about the effectiveness of the controls included in the plan adopted by the General Assembly. Because of the uncertainties in the forecasts, during the continuing planning process emission reduction estimates will be closely monitored. The effectiveness of the programs recommended will also be closely monitored. Appropriate adjustments will be made as additional information is gathered and the uncertainties are reduced. But to repeat a point made earlier in this chapter, the forecasts on which this plan is based are as objective, rigorous and accurate as possible at this time.

TABLE 22

**Air Quality
Maintenance Plan**

recommendations

Air Quality Maintenance Plan recommendations

RECOMMENDATIONS	DIRECT BENEFITS (Hydrocarbon emission reductions, tons/day) 1985 2000	RESPONSIBLE AGENCY (or agencies)	SCHEDULE FOR ACTION A - Adoption I - Fully Implemented	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
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I. Stationary source controls

GENERAL POLICY: REDUCE HYDROCARBON EMISSIONS FROM STATIONARY SOURCES

Action 1

Use available control technology on existing hydrocarbon sources, allowing a reasonable amortization schedule for air pollution control equipment. Available control technology means an emission limitation based on the maximum degree of reduction of hydrocarbons emitted from or which results from any emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such facility through application of available methods, systems and techniques. Technology for selected processes, which have been included in the projections of emission reductions, are as follows:

225 337

Bay Area Air
Pollution
Control District
(BAAPCD)

A - 1980
I - 1985

\$529,000^a
*\$18,000,000^b

Administrative/
Regulatory
- Ad valorem
tax revenues
- ARB subvention
Funds
- Federal Clean
Air Act funds

BAAPCD
Enabling
Legislation

Operating/
Maintenance
- Private

Capital
- Private
- California
Pollution
Control
Financing
Authority
- Federal
Small
Business
Administration
Loan Programs

*Costs are considered
underestimates due to
choice of discount rate.

PROCESS

TECHNOLOGY

Organic storage.....Secondary seals
Tar pots.....Loading door assembly
Paint spray booth.....Incinerator or low/no solvent coatings
Architectural coating.....Low solvent coatings
Dry cleaning.....Closed system with solvent recovery
Cable tar coating.....Incineration
Gasoline bulk storage.....Floating roof or fixed roof & vapor recovery
Auto service station storage tanks.....Balanced system
Auto fill operations.....Balance system

Action 2

Continue the review of new and modified industrial facilities (new source review), using offsets and/or other provisions of the Clean Air Act Amendments of 1977 to allow for a reasonable level of growth consistent with the requirements of the act. Use technology to produce the lowest achievable emission rate (LAER), as defined by the Clean Air Act Amendments of 1977, on new and expanded hydrocarbon sources.

Combination of
ACT in Action 1
and LAER are
estimated to re-
duce hydrocarbon
emissions by 225
tons/day in 1985
and 337 tons/day
in 2000. From
NSR and offsets,
64 tons/day are
targeted for 1985.
Additional emis-
sion reductions
required to main-
tain standards
will depend on
regional growth
rates and success
of other control
programs. It is
highly unlikely
that more than
150 tons/day can
be reduced by
2000.

BAAPCD

Currently
being
implemented

Increased cost
to industry
for emission
offset purchases.

BAAPCD
enabling
legislation

^a Public agency

^b Private

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o See "Direct Benefits" column.

Water Quality

- o No impacts.

Physical Resources

- o Between 18,000 and 25,000 gallons per day of organic solvents could be conserved from proposed organic solvent controls.
- o Available control technology would consume construction materials, water, disposal facilities, etc. However, it does comprise many things and has not been identified with regard to Bay Area industrial operations. Consequently, more detailed assessments will require further definition of ACT.

Energy Resources

- o Use of available control technology for hydrocarbon emissions (including the use of high solids/water base coatings and closed systems for organic liquid storage) should not result in a net energy penalty. Certain technologies such as industrial water based coatings and solvent incineration involve energy penalties, while other technologies such as high solids coatings and improved vapor recovery systems produce energy savings.
- o Current new source review activities could be perpetuating excessive energy use by old and inefficient plant operations that are presently unable or unwilling to meet stringent NSR requirements in order to modernize.

Amenities

- o The principal impact of the stationary source actions would be their contribution toward the improvement of air quality in the Bay Area.

Institutional

- o The governmental structure for implementing these control measures already exists in the Bay Area Air Pollution Control District which actively enforces air pollution control programs in the Bay Area. The measures being proposed for consideration here are simply more stringent extensions of measures already in force for control of industrial and stationary sources of air pollution.

FinancialDirect Public Costs of Implementation

- o See public costs (a) in the column headed "Total Cost/Yr. of Recommended Action."

Fiscal Effects on Local Governments

- o The BAAPCD operating funds are obtained from local property taxes and State and Federal grants. Exactly how the costs will be apportioned is presently unclear; however, no direct costs to local governments are expected

Production of Goods and Services

- o Increased technological dependence by the Bay Area industrial sector to improve regional air quality will require considerable capital investment. In some instances, these added restrictions and costs may adversely affect the competitive position of local industries inter-regionally where the cost of these investments may be passed on to the consumers.
- o Measures pertaining to coatings will require that process changes occur in order to reduce levels of air pollution. Changed product composition resulting from different processes could result in reduced durability and therefore increased product liability potential for the coatings industry. Phased implementation of this program should help minimize these problems.
- o Increased cost to industry for emission offset purchases
- o Special consideration may be needed for food processing industry in meeting other public health standards.

Income and Investment

- o See Private Costs (b) in the column headed "Total Cost/Yr of Recommended Action."

Consumer Expenditures

- o While the direct costs of implementing these measures will initially fall upon industry, many, if not all of them will find their way to the consumer and local taxpayer. Since supporting this type of activity is not the type of expense to result in increased productivity or in direct economic return for most of them, it may be considered an inflationary cost. In addition, higher prices for Bay Area products reflecting this cost may become less attractive to non-Bay Area consumers who may look elsewhere for the same product. On the other hand, consumers and local taxpayers may view the costs of implementation as an investment having non-economic but equally valuable return. In either case, implementation of the proposed control measures is likely to result in an increased cost of consumer goods.

Housing Supply

- o No impact.

Physical Mobility

- o No impact.

Health and Safety

- o Air quality standards for each of the pollutants are based upon scientifically derived air quality criteria. Air quality criteria are an expression of current information concerning the relationship between various concentrations of pollutants in the air and their adverse effects on man and his environment. The control measures being proposed are designed to meet the standards, i.e., to reduce the concentration of various pollutants in the air. Pollutant concentration reductions from the air will reduce potentially adverse effects from these substances, thereby favorably impacting public health.

- o With regard to safety, the stationary source control program may eliminate many hazards associated with the use and storage of combustible solvents.

Sense of Community

- o No impact.

Equity

- o A major question of equity involves the competitive position of Bay Area industries that are placed under the restrictions and controls proposed by the stationary source measures. This question can be extended to employment opportunities for the local population. Some employment and business opportunities will be created in local industries producing air pollution control equipment. However, whether or not those opportunities will be available or sufficient to offset increased unemployment resulting from competitive disadvantage (see "Production of Goods and Services") is an issue requiring further exploration. The willingness of the U. S. Environmental Protection Agency and the California Air Resources Board to require similar measures outside of the Bay Area is of obvious concern to the region.

AIR QUALITY MAINTENANCE PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	DIRECT BENEFITS (Hydrocarbon emission reductions, tons/day) 1985 2000	RESPONSIBLE AGENCY (or agencies)	SCHEDULE FOR ACTION A - Adoption I - Fully Implemented	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
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II. Mobile source controls

GENERAL POLICY: REDUCE HYDROCARBON EMISSIONS FROM MOTOR VEHICLES.

Action 3 Implement more stringent vehicle (light duty and heavy duty) exhaust emission controls--approx. 50% reduction below 1977 prescribed levels.	- 62	California Air Resources Board (CARB)	A - 1980 I - 1990	\$3,000 ^a \$24,910,000 ^b	- Private	Mulford-Carrell Air Resources Act
Action 4 Implement Statewide inspection/maintenance program for light and heavy duty vehicles.	23 58	CARB and/or Bureau of Automotive Repair	A - 1978 I - 1985	\$1,395,000 ^a \$16,892,000 ^b	- I/M Program revenues - State General Fund	New Legislation Required
Action 5 Require exhaust control devices on existing heavy duty gasoline vehicles Statewide.	25 -	CARB	A - 1979 I - 1985	\$8,000 ^a \$1,534,000 ^b	- Private	New Legislation Required
Action 6 Permit no further delays in implementing strict emission requirements on automobiles, provided, however, that if such delays are granted by either the California Air Resources Board or Congress, this region should be provided with extensions beyond the deadlines required by the Clean Air Act Amendments of 1977.						

^a Public agency

^b Private

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o See "Direct Benefits" column.

Water Quality

- o No impact.

Physical Resources

- o No significant impact on physical resources is expected from more stringent exhaust emission controls where such can be achieved by further technological improvement of conventional vehicle engines. However, if new engine designs requiring alternative fuel sources are pursued to achieve this measure, then new materials may be required to manufacture these engines. (For example, electrically-powered vehicles may require special material to construct batteries capable of providing satisfactory power performance.) Of greater significance is the possibility that new engine technologies will utilize less specialized fuels, thereby reducing dependence on gasoline or petroleum per se.

Energy Resources

- o Mobile source emissions controls will produce significant energy savings through improved maintenance of engines and emission control systems, as well as through the eventual development of new engine technologies. The inspection and maintenance program and the retrofit program for heavy duty gasoline trucks could save approximately 10,000,000 gallons of gasoline per year, or about 240,000 barrels of oil per year. New engine technologies could eventually produce as much as 50 percent improvement in vehicle mileage, which in turn would mean annual energy savings of millions of barrels of oil.

Institutional

- o The governmental structure for implementing mobile source control measures already exists in the California Air Resources Board (CARB) which presently has primary responsibility for controlling vehicular emissions in the State. However, specific institutional arrangements for implementing both the inspection/maintenance programs and the heavy duty gasoline retrofit program will be required since none of them are within the current authority of CARB.

The California Air Resources Board and/or the Bureau of Automotive Repair (BAR) would likely assume responsibility for the regulation and operation of I/M programs. Local governmental agencies involvement is not anticipated. The CARB has had experience with implementing retrofit programs in the past. It is assumed that implementation of the proposed heavy duty gasoline retrofit program would be assumed by CARB.

Inspection/maintenance (I/M) programs can be directly administered by the State, or franchised out to private contractors. Data from a pilot I/M program currently being operated in the South Coast Air Basin suggests that the operation of such programs might make disproportionate demands on the administrative resources of the State. Therefore, a private-operated/public-monitored program may be preferable for the Bay Area.

FinancialDirect Public Cost of Implementation

- o See Public Costs (a) in the column headed "Total Cost/Yr of Recommended Action."

Fiscal Effect on Local Government

- o No impact.

Production of Goods and Services

- o A slight increase in the production activity of some industries servicing the automobile manufacturing industry might occur as new tooling required to produce newly designed engines is needed. New engine design may stimulate substantial change in the automotive repair and service industry. The implementation of the inspection/maintenance (I/M) measures would add a new line of service for the California automotive service industry. Some services presently exist for identifying defective emission control equipment on cars. They are not, however, universally applicable to all California registered vehicles. I/M programs for light, medium, and heavy duty vehicles would offer a universally applied service program for identification and repair of vehicles with excessive emission caused by mal-adjusted or defective emission control equipment.

Income and Investment

- o See Private Costs (b) in the column headed "Total Cost/Yr of Recommended Action."

Consumer Expenditures

- o The manufacture of new engine technologies would necessitate an increase in the initial cost of new vehicles. This increase may be offset, however, by savings in operating cost throughout the lifetime of the vehicle. Catalytic converters are estimated to cost about \$350.00 per heavy duty vehicle. (Price includes cost of the device and installation charges.) For a light and medium duty vehicle I/M programs an inspection fee of \$5-6.00 per vehicle would be required. The average cost of repairs for the catalyst equipped vehicle is about \$45.00.

Housing Supply

- o No impact.

Physical Mobility

- o Because of increased cost of private transportation, the mobility of the limited income segment of the Bay Area population may be impaired. This would be particularly true for those located in other than urban centers.

Health and Safety

- o These control measures would substantially reduce carbon monoxide emissions from motor vehicles. Therefore, substantial health-related benefits may accrue to those segments of the population that experience the heaviest exposure to carbon monoxide concentrations while residing, working or shopping in urban centers.

Sense of Community

- o No impact.

Equity

- o The measures will adversely impact some groups in urban areas more severely than others--particularly those with limited income.

Urban Pattern

- o No impact.

AIR QUALITY MAINTENANCE PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	DIRECT BENEFITS (Hydrocarbon emission reductions, tons/day) 1985 2000	RESPONSIBLE AGENCY (or agencies)	SCHEDULE FOR ACTION A - Adoption I - Fully Implemented	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
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III. Transportation controls

GENERAL POLICY: REDUCE MOTOR VEHICLE EMISSIONS THROUGH TRANSPORTATION ACTIONS TO REDUCE VEHICLE USE

Action 7

Preferential parking for carpools and vanpools.

0.1 Not estimated separately

Cities, counties, employers, MTC.

A - 1978
I - 1985

\$886,000^a

- Federal Aid highway programs
- Local Transportation Development Act funds

- Caltrans enabling legislation
- Local planning and traffic control enabling legislation

Action 8

Pursue a three-fold transit improvement strategy.

1.3

MTC, transit districts (e.g., MUNI, AC, BART)

A - 1978
I - 1985

\$30 million^a

- Federal Mass Transportation Assistance Programs
- Fare revenues
- Local Transportation Development Act Funds
- State Highway Trust Fund diversions

- Local Transit District Enabling Legislation
- Bay Area Rapid Transit District Enabling Legislation
- Interagency Memoranda of Understanding

(1) MTC, in cooperation with transit operators, will adopt service improvement objectives which can be financed by the existing commitment of resources to transit. Improved capacity, service, and ridership are contemplated. A measure of the improvement expected should be agreed to and committed to in the context of the RTP by October 1, 1978.

(2) MTC will continue its efforts to identify the need for additional services (as it has, for example, in the elderly and handicapped program and more recently in the Minority Transportation Needs Assessment Project (MTNAP) and to pursue providing additional services as they are justified. A measure of the improvement expected will continue to be developed as these special needs are examined and as the demand for transit services expands generally.

(3) During the commute hours all major transit systems in the Bay Area are at capacity. Any substantial increase in ridership will be dependent upon increased Federal or State financial assistance. The amount of rider-

^a Public agency

^b Private

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o See "Direct Benefits" column.

Water Quality

- o No impact.

Physical Resources

- o No impact.

Energy

- o Gasoline savings from carpooling, the shift to transit, improved traffic flow, and the shift to bicycles.
- o Minor increase in transit fuel consumption.

Amenities

- o Cleaner air.

Institutional

- o Additional transit service would be provided by the present operators.
- o Ride sharing programs would be handled by a recently established non-profit corporation.
- o Caltrans would implement high-occupancy vehicle (HCV) lanes and carpool lots.
- o Cities and counties would implement bicycle measures. Private employers and businesses would be encouraged to participate.

Financial

- o Certain measures, notably the additional transit services, bus/carpool lanes, and bicycle systems, are costly. There is some funding available, but additional funds will be needed. MTC has suggested that the State and Federal governments provide the funding necessary to support the transit improvements.

Production of Goods and Services

- o New employment in the transit sector.

Consumer Expenditures

- o Savings to those commuters utilizing carpools, vanpools or transit.

Housing Supply

- o No impact.

Physical Mobility

- o Additional transit service would increase mobility of all transit users.
- o Carpool/vanpool measures would increase travel options for most commuters.

Health and Safety

- o Reduction in auto accidents with improved peak period flow.
- o Possible increase in number, but not rate, of bicycle accidents with increased usage.

Sense of Community

- o No impact.

Urban Patterns

- o May encourage a more compact land use pattern, with employees living closer to transit lines and/or their jobs.

Equity

- o Measures such as additional transit service will particularly benefit low income, handicapped and other persons who depend on this mode of travel.

IMPACTS IDENTIFIED ARE FOR
ACTIONS 7, 8, 9, 10, and 11

AIR QUALITY MAINTENANCE PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	DIRECT BENEFITS (Hydrocarbon emission reductions, tons/day) 1985 2000	RESPONSIBLE AGENCY (or agencies)	SCHEDULE FOR ACTION A - Adoption I - Fully Implemented	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
ship increase is directly affected by the amount of increased State and Federal funding. Provision of additional transit capacity represents a positive transportation strategy. Thus the State and Federal governments are encouraged to provide necessary funding support for transit improvements to offset any air quality deficiencies caused by deleting less desirable transportation control measures. Without this financial support, transit capacity cannot be significantly expanded.						
Action 9 Support development of high occupancy vehicle lanes and/or ramp metering on selected freeway segments when justified on an individual project basis.	0.2 Not estimated separately.	Caltrans, transit districts, cities and counties.	A - 1979 I - 1985	\$7,438,000 ^a	- Federal Aid Highway Programs - State Highway Programs funds	- AB 69 (State Transportation Planning Enabling Legislation) - AB 363 (Bay Region Transportation Planning Legislation) - Caltrans Enabling Legislation - Local Planning and Traffic Control Enabling Legislation
Action 10 Provide more ride sharing services such as jitneys and vanpools. Objectives need to be developed and monitored to gauge the desirable rate of expansion.	1.7	Caltrans, employers, MTC	A- Previously adopted I - 1979	\$300,000 ^a	- Federal Transportation Funding	
Action 11 Develop more extensive and safe bicycle systems and storage facilities. Objectives need to be developed and monitored to gauge the desirable rate of expansion.	2.0	Cities, counties, MTC, Caltrans	A - 1980 I - 1985	\$438,000 ^a	- Federal Aid Highway Programs - Local Transportation Development Act Funds	- Federal-Aid Highway Legislation - Local Transportation Development Act Legislation
Action 12 MTC is requested to consider the following action: "Complete construction of certain portions of State freeway systems in which there are now pollution-causing gaps."		MTC	1978	0		- MTC enabling legislation

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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AIR QUALITY MAINTENANCE PLAN RECOMMENDATIONS (continued)

RECOMMENDATIONS	DIRECT BENEFITS (Hydrocarbon emission reductions, tons/day) 1985 2000	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION A - Adoption I - Fully Implemented	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
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IV. Other measures

GENERAL POLICY: ENSURE MAINTENANCE OF THE OXIDANT STANDARD BEYOND 1985-87

Action 13

Adopt between 1985 and 1987, and implement in 1990 or thereafter, one or more of the following measures to ensure maintenance of the oxidant standard through the year 2000, subject to further evaluation of the measures during the continuing planning process:

- o Reduce hydrocarbon emissions from small gasoline engines
- o Reduce hydrocarbon emissions from off-highway mobile sources
- o Implement more stringent vehicle exhaust emission controls--Approximately 60-80% reduction below 1977 prescribed levels.
- o Provide additional transit

0 24

ARB; BAAPCD;
ABAG; MTC;
transit
operators.

A - 1985-87
I - 1990-95

To be
determined

To be
determined

Clean Air Act,
Mulford-
Carrell Act

ENVIRONMENTAL IMPACTS

INSTITUTIONAL/FINANCIAL IMPACTS

ECONOMIC IMPACTS

SOCIAL IMPACTS

Air Quality

- o The four measures are estimated to reduce hydrocarbon emissions by 24 tons/day by the year 2000
- o Localized increases in CO, NO_x and particulates where diesel fuel substitutes for gasoline and as result of increased transit

Water Quality

- o No impacts

Physical Resources

- o Reductions in adverse biological effects on vegetation (trees, shrubs, agricultural crops) from improved air quality

Energy

- o May result in use of alternative fuel sources; less specialized fuels
- o May require new materials for engine manufacture (e.g. batteries for electrically powered vehicles)
- o Increases in transit would save millions of gallons of gasoline from reduced auto use (e.g. 25% increase would save approximately 29.5-59.5 million gallons of gasoline per year; 50% increase would save approximately 44.5-87.6 million gallons of gasoline per year).
- o Increases in transit would consume diesel fuel (e.g. 25% increase would consume approximately equivalent of 131,000 barrels crude oil or 5.5 million gallons of gasoline; 50% increase would consume approximately equivalent of 263,000 barrels crude oil or 11 million gallons of gasoline annually)

Amenities

- o Air quality improvements would contribute to overall visual quality.

Institutional

- o Authorities to implement these measures already exist
- o Institutional mechanisms to carry out these measures already exist

Financial

- o Public costs to implement these measures will be determined during the continuing planning process
- o Additional transit rolling stock would depend on availability of Federal and State financial assistance.

Production of Goods and Services

More stringent vehicle exhaust emission controls may slightly increase production activity of some auto manufacturing service industries. Inspection/maintenance would add new line of service to auto service industry.

Additional transit would result in employment. For example a 25% increase would require approximately 855 additional buses; a 50% increase approximately 1710 buses. Assuming one full-time position for each additional bus, the resulting jobs range from 855-1710 new transit driver jobs, plus an uncalculated number of service jobs (e.g. transit mechanics, captains, etc).

Income and Investment

- o Employment benefits will result in total wage and salary increases
- o Capital investment for transit improvement would require Federal and State financial assistance. Operation and maintenance costs would be financed from system revenues.

Consumer Expenditures

- o New equipment emission standards would add to costs of small gasoline engines (e.g. lawnmowers, garden tractors) and off-highway mobile sources (e.g. tractors, graders). Some costs could be kept low by requiring relatively simple control systems (crankcase ventilation for small gasoline engines). Retrofit for off-highway mobile sources may be relatively inexpensive as positive crankcase ventilation (PCV) devices cost little and do not significantly effect performance. Equipment manufacturers are currently working on reducing exhaust emissions; most new equipment being produced with diesel engines and climate enables year round use and more rapid expiration of service life.
- o More stringent vehicle exhaust emission controls would increase costs of new vehicles but may be offset against savings in operating costs throughout life of vehicle. Example costs: catalytic converter cost estimated at 350 per heavy duty vehicle; I/M fees of \$5-6 per vehicle for light and heavy duty vehicles; average repair for catalyst equipped vehicle \$45

Housing

- o no impacts

Physical Mobility

- o Transit improvements would improve the mobility of transit dependent, low-income and individuals in proximity to transit.
- o Increases in cost of private transportation (associated with increased costs of new vehicles to meet exhaust emission controls) could affect the mobility of individuals dependent on the private auto. May impair the mobility of the limited income segment of the population living in rural areas or areas not serviced by transit.

Public Health and Safety

- o Maintenance of Federal photochemical oxidant standard will have public health benefits for general population and particularly for sensitive populations such as elderly, children and chronically or temporarily ill.
- o Exhaust controls for small gasoline engines will have localized or individual benefits. Exposure of equipment operators and people in immediate vicinity may be significant especially from 2-stroke engines; health benefits of cleaner engines should be stressed.
- o See also impacts for transportation measures.

Sense of Community

- o See Physical Mobility and Public Health and Safety

Urban Patterns

- o Same as noted for transportation measures

Section-H

IMPLEMENTATION OF THE PLAN

Section G identified a wide range of air quality measures needed to meet and maintain the oxidant standard. An overall implementation schedule for each measure was also presented. This section further details how the plan would be carried out. It describes the roles of different implementing agencies, requirements for new legislation, and requirements set forth by the Clean Air Act of 1977.

IMPLEMENTING THE AQMP RECOMMENDATIONS

The authority to implement most of the AQMP recommendations currently exists among the various State, regional and local agencies. In a few instances, new legislation would be required to carry out a few of the proposals. However, to a large extent the plan recommendations build upon existing powers and proposes programs which extend these authorities.

Air pollution controls in the Bay Area have been the primary responsibility of the California Air Resources Board and the Bay Area Air Pollution Control District. In the plan, both agencies continue to have very important roles. These two agencies would be responsible for ensuring that available control technologies for stationary and mobile sources are being used. This would apply to existing sources in each case. New sources would also be stringently controlled.

The plan also identifies important roles for State and regional agencies and local governments of the Bay Area. Both general and special purpose agencies would be involved. These agencies would be responsible for reducing the amount of automobile travel in the region through transportation improvements. These would help reduce regionwide increases in the length and number of automobile trips made.

Federal agencies also would play an important role in carrying out the AQMP. As in the past, the Environmental Protection Agency must continue to provide technical assistance. Available control technologies will have to be precisely defined. Important oxidant control issues such as long range transport and the precise role of nitrogen oxides in oxidant formation, need further research.

Federal agencies will also be needed to provide financial assistance. Such support is needed for further planning, monitoring activities, and in some cases to fund implementation of important programs. It is assumed under the Clean Air Act of 1977 that funds for planning and carrying out key air pollution control programs will continue to be granted to California and Bay Area governmental agencies. For example, the Clean Air Act of 1977 may be able to assist states financially in implementing inspection and maintenance programs. Also, if the Bay Area is to significantly improve and expand its transit service, the U.S. Department of Transportation would have to provide additional funds to subsidize operation and maintenance expenses. Other grants would be required to fund the capital costs of the buses and other transit vehicles.

Stationary Source Controls -- The Role of the Bay Area Air Pollution Control District

Three basic programs would be carried out by the Bay Area Air Pollution Control District. These programs are:

- Use of available control technology (ACT) for existing industries
- Use of technology to produce lowest achievable emission rates for new sources
- A review (and permit program) for new and modified air pollution sources to ensure use of BACT and a determination of the source's contribution to further violations of air quality standards. The District, as previously noted, has had some form of new source review rule in effect since 1972, and is currently reviewing the rule to consider options which would permit emission off-sets.

The Bay Area Air Pollution Control District has the authority to adopt an ACT rule after public hearings. Adoption of such a regulation requiring industry to use specific control technologies would warrant careful thought and extensive public hearings. The most probable form of such a rule would incorporate available control technology into a permit system, and would work from a catalog listing the best available control methods or equipment in any particular situation. Possibly there would be some flexibility in what methods or equipment would be required to accommodate the wide variety of sizes, forms, design and operations to be found in the many industries affected. The catalog would be regularly reviewed and updated, with a continuing critique provided by the District's Advisory Council.

An available control technology rule could supercede performance standards or be applied in conjunction with performance standards. Minimum performance levels could be used to prevent deterioration of the best available control technology after installation. In some cases, existing performance standards in effect require use of best available control technology.

Implementation of an available control technology rule would require an increase in the District's engineering staff and probably Legal and Hearing Board staff. An additional ten engineers would be needed to carry out the work required by such a rule. It is also expected that the District's Hearing Board activities would increase as a result of such a rule.

An available control technology rule could be adopted by the end of 1979. Five years should be allowed for full implementation. This regulation would cover a wide range of operations within the Bay Area. The rule itself is likely to be controversial and therefore subject to some delays as it is being adopted. Many establishments, for example, may have recently incurred expenses for control equipment that may now be declared obsolete. In the adoption process, the District's Board of Directors could consider exemptions and extended time schedules for classes of industries or small operations. After the rule had been adopted, individual appeals could be made to the District's Hearing Board for variances from the regulation where justified.

The AQMP assumes continued application of a New Source Review rule for new and modified industrial or commercial facilities. The Bay Area Air Pollution Control District is currently reviewing a series of alternatives which would permit emission off-sets. Any or all of these suggested changes to the present rule could be adopted within six months. This period would allow time for public hearings and the BAAPCD Board of Directors to consider the changes to be adopted. In any event, the use of New Source Review as it presently stands or as modified to permit emission off-sets is key to the Bay Area's demonstration of meeting and maintaining the oxidant standard.

Mobile Source Controls - The Role of the California Air Resources Board

Three programs are recommended for implementation by the California Air Resources Board. These control programs are:

- Adoption of more stringent light and heavy duty exhaust emission standards
- Implementation of a Statewide inspection and maintenance program for light and heavy duty vehicles
- Implementation of a heavy duty gasoline exhaust retrofit device for in-use heavy duty gasoline vehicles Statewide.

The requirement for carrying out these programs are different in each case. These differences are described briefly below.

Section 209(b) of the 1977 Clean Air Act permits California upon request to the Environmental Protection Agency to obtain a waiver from the Federal auto exhaust emission standards. Such a waiver would allow California to adopt more stringent automotive exhaust emission standards. A similar provision was also in the 1970 Clean Air Act because of the particularly severe air pollution problems in California and the need for more stringent controls. The California Air Resources Board has been successful in obtaining such a waiver for adoption of stricter standards. Under the plan recommendation, the California Air Resources Board would again exercise its authority to implement tighter exhaust emission standards than the rest of the country.

Under the 1970 Clean Air Act, only California was permitted to adopt more stringent standards. The 1977 Clean Air Act now permits other states to adopt California's standards where such standards are more stringent than the Federal standards. This provision of the 1977 Act reinforces the importance of California's role in leading the country for requiring the most stringent standards achievable by the automotive industry. In fact, under the 1977 Act, the California Air Resources Board and the Environmental Protection Agency need to work closely to set exhaust emission standards that are stringent, but technologically achievable. Clearly, if the Federal government requires tighter controls than those identified in the 1977 Clean Air Act, it will be much easier for California to follow suit. Even without such action, however, it appears

quite plausible that a further tightening of light and heavy duty exhaust emission standards for vehicles manufactured after 1990 is possible. Because of the implementation schedule assumed for this measure, the tighter exhaust standards is strictly a maintenance measure. This program would be needed to partially offset the large growth in travel projected for the region by the year 2000.

A Statewide vehicle inspection and maintenance program would require State legislation to be implemented. This program would be carried out by the California Air Resources Board and/or the State Department of Consumer Affairs, Bureau of Automotive Repair. The Clean Air Act of 1977 requires that a specific schedule for implementation of a vehicle inspection and maintenance program be included before any time extensions beyond 1982 are allowed for meeting the oxidant standard. It has been assumed that the 1977 Act requirements will be the primary moving force to getting inspection and maintenance implemented in the Bay Area. This program is important for meeting the oxidant standard by 1985-87 and long term maintenance of the standard thereafter.

Implementation of a heavy duty retrofit program would require new State legislation. Such legislation would include the California Air Resources Board to be designated the appropriate implementing agency for the program. To achieve maximum effectiveness from this program, two factors are important:

- The measure would have to be implemented as soon as possible (and no later than 1985). As older vehicles are replaced the need and effectiveness of this control program diminishes.
- The measure would have to be implemented on a Statewide basis. This would prevent vehicles from being registered outside the Bay Area and thus exempt from the control. This would not solve the problem of vehicles registered outside the State. Since many heavy duty vehicles provide inter-state transport, the enforcement aspects of this program could pose some problems.

The heavy duty vehicle retrofit program would be implemented in two stages. The first stage would be to retrofit all 1971-76 model year vehicles by 1980. The second stage would be to require all 1977-82 heavy duty vehicles to be retrofitted by 1985. This program is primarily an attainment measure. Because of the nature of retrofit programs, only short term benefits are gained. Nonetheless, this program is an important part of the broad-based strategy set forth in the plan.

Transportation Controls - The Role of the Metropolitan Transportation Commission and Others

The Metropolitan Transportation Commission is responsible for preparing the transportation plan for the region. Once the AQMP is adopted, it would be necessary for the Metropolitan Transportation Commission to adopt the transportation control measures in the AQMP as part of the Regional Transportation Plan. In addition, it would be necessary for MTC to coordinate the development of an implementation program for each control measure.

The three-fold transit improvement strategy adopted by the Metropolitan Transportation Commission and the General Assembly will be heavily dependent on additional Federal and State financial assistance. MTC would assist in the development of new transit service by allocating the funds to transit operators. Actual implementation of the service improvements would be the responsibility of the individual transit districts, and would be programmed to take place over a five year period beginning in 1980.

Implementation of incentives to the use of high occupancy vehicles (e.g., carpools) would be the primary responsibility of the California Department of Transportation. Caltrans would implement the bus and carpool lanes and ramp metering measure relying primarily on federal funds, and would expand its current program of leasing lots underneath freeways and other locations to provide preferential parking for carpools. Carpool matching and data services currently provided by Caltrans will be taken over and expanded by a recently formed non-profit corporation. Finally, to encourage employers to set aside preferential parking for carpools, the Metropolitan Transportation Commission would provide planning assistance and publicity to participating employers.

Implementation of incentives to the use of non-motor vehicle forms of transportation (i.e., bicycling and walking) would primarily be the responsibility of cities and counties, with State and federal funding assistance.

Bicycle systems are an acknowledged part of the Regional Transportation Plan. Local planners would design facilities, map routes and locations, and estimate costs, while the Metropolitan Transportation Commission would assemble the local plans into a regional plan to aid in securing State and federal construction grants.

Maintenance Measures

Four maintenance measures identified under General Policy IV for adoption between 1985 and 1987 and for implementation in 1990 or thereafter will be further examined during the continuing planning process. Implementation of technological controls on small gasoline engines would be the responsibility of the Air Resources Board. So would emission controls on off-highway mobile sources, and more stringent vehicle emission controls. Additional transit improvements, like those recommended under General Policy III, would be the responsibility of MTC and the transit operators. It is possible that other agencies would have implementation roles for these controls, and this would be examined further during the continuing planning process.

REQUIREMENTS OF THE CLEAN AIR ACT OF 1977

The current AQMP planning effort was more than a year old when the Clean Air Act of 1977 was signed into law. The 1977 Act sets forth specific requirements for "non-attainment plans". Key requirements are cited below, along with brief discussions of how the requirements relate to the AQMP presented. In particular, the plan provisions required by Section 172(a) relating to actions needed prior to any major construction after July 1, 1979 are:

- (1) "be adopted by the state " -- this plan has been written for inclusion in a State Implementation Plan.
- (2) "implementation of all reasonably available control measures" -- although subject to some interpretation, this plan adopts reasonably available control measures for implementation to meet and maintain the oxidant standard.
- (3) "require, in the interim, reasonable further progress: -- if carried out as proposed, this plan would demonstrate reasonable and steady progress toward the oxidant standard.
- (4) "include a comprehensive, accurate, current inventory of actual emissions from all sources" -- this plan contains such an inventory.
- (5) "identify and quantify the emissions...allowed...from major new...sources" -- such an analysis is shown in Figure 27 -- Section 6.
- (6) "require permits for...new or modified...sources" -- this plan recommends continuation of the New Source Review rule being implemented by the Bay Area Air Pollution Control District.
- (7) "identify and commit the financial and manpower resources necessary to carry out the plan" -- the financial and manpower resources needed to carry out the plan have been identified; commitments can only come after the plan has been adopted and approved by the many agencies responsible for carrying it out.
- (8) "emission limitations, schedules of compliance" -- emission limitations to meet the standard and an implementation schedule have been prepared in this plan.
- (9) "evidence public, local government, and State legislative involvement" -- these requirements have been partially met during the plan preparation and will be fully met as the plan is publicly reviewed over the next six months.
- (10) "evidence...the necessary requirements...to implement and enforce...the plan" -- this section described requirements for implementing the plan, including as necessary identification of new legislation required. Considerable work remains for the continuing planning process to secure all the needed agreements, regulations, ordinances, and statutes necessary to implement and enforce the plan as proposed.

The Clean Air Act of 1977 provides for time extensions beyond 1982 for areas with severe oxidant and/or carbon monoxide problems. The analysis shown in Section F and the implementation time schedules described in this section provide a sound basis for formally requesting a time extension for photochemical oxidants.

Section-I

BENEFITS AND COSTS OF THE PLAN

This section summarizes the benefits and costs of the Air Quality Maintenance Plan. As mentioned previously, this plan emphasizes the control of emissions that form photochemical oxidants, the most serious air quality problem in the region. Reducing the concentration of photochemical oxidants has three types of benefits:

- Improvements in public health
- Reduction in damage to vegetation
- Reduction in damage to other materials

The controls required to achieve these benefits will cost money. These direct costs are also summarized in this section. Other effects accompanying the controls have been described in Section G of this chapter as well as Chapter II.

This section summarizes the latest information on effects. Like other investigations of this nature, there are limitations and uncertainties in the available data. The adverse effects described herein would be significantly reduced or eliminated as this plan is carried out. These improvements constitute, therefore, the benefits of carrying out the plan.

THE BENEFITS OF CLEANER AIR

Air pollution can have deleterious effects--sometimes very serious effects--on health. Pollution can also damage or destroy plant life and other materials. These adverse effects are set forth below.

Effects on Human Health

Photochemical oxidants have been found to cause eye irritation, nasal irritation, irritation of mucous membranes, respiratory distress and difficult breathing, increased fluid in the lungs, coughing, rapid pulse rate, lowered blood pressure, asthma attacks, and overall decrease in the quality of human performance.

Some of these effects have been observed at relatively low oxidant levels. In other cases, short-term exposure to relatively high oxidant or ozone levels has produced few if any negative effects. There are two reasons for such variable results. One is that pollution combines with many other factors to affect health. For example, under certain conditions, even low oxidant levels can be harmful. The other reason is that each individual responds differently to oxidant exposure. Thus, the Federal standards for oxidant levels have been set to protect sensitive population groups--and that includes most people at one time or another--children, the elderly, and the chronically or temporarily ill.

A large number of statistical studies, clinical analyses of specific case histories, and controlled experiments have been conducted to determine the effects of photochemical oxidant or ozone exposure. Effects from short-term exposure to high pollutant levels are more easily observed than are effects from long-term exposure to more moderate levels. Following is a brief summary of effects observed in some of these studies. As described in Section D, high levels of oxidant in the region frequently reach 2-3 times (.16 - .24 ppm) the 0.08 ppm standard, depending on meteorological conditions.

- In several American studies, eye irritation has been observed at daily maximum hourly concentrations ranging from about 0.1 ppm to about 0.15 ppm. Recent Japanese studies raise the possibility that even lower oxidant concentrations may contribute to eye irritation under certain conditions. Such values, as previously shown, are quite typical of levels reached in the Bay Area. The consistency of the association between short-term oxidant exposures and eye irritation arouses concern about the long-term effects of such exposures.
- Several studies have noted a gradual decrease in human athletic performance under short-term exposures to photochemical oxidant. Investigators observed that high-school cross country runners did not perform as well when hourly concentrations increased from about .03 to .30 ppm. Best performances were almost always on days of low oxidant concentrations. Other similar studies suggest that on high-oxidant days, the irritant effects of pollutants may have restricted the runners' mechanical lung function sufficiently to prevent them from taking in enough oxygen to support their potential performance levels.
- Respiratory distress in healthy people, especially children, has been frequently noted. Symptoms observed in school children, including sore throat, headache, cough and difficult breathing, were higher on days when maximum hourly oxidant levels equalled or exceeded .15 ppm than on days when concentrations were below .10 ppm.
- Short-term oxidant exposure has also been associated with aggravation of existing disease. Thus, individuals with existing respiratory ailments are more likely to be affected by oxidant pollution.
- Investigators have observed a significantly higher rate of asthma attacks on days when oxidant concentrations exceeded .25 ppm.
- A 1973 study measured significant impairment in lung function in 10 normal male subjects aged 23-53 years (including two smokers) exposed to pure ozone at 0.75 ppm for 2 hours. Two of the three subjects who exercised intermittently showed accentuated effects. In other similar experiments, most subjects complained of cough, chest tightness, and soreness. A few also had pharyngitis, difficult breathing and wheezing.
- Some limited studies have shown evidence of human health effects from ozone at concentrations of 0.25 ppm and preliminary findings of a 1976 study suggests lowered lung function at 0.1 ppm exposure for 2 hours.

Additional studies on occupational exposure to ozone are summarized in Table 23. It is evident from the table that a wide range of responses has been observed. Investigators recognize that short-term exposure to high pollutant levels can indicate the potential for serious problems from long-term exposure to moderate or low levels. While specific effects may not be the same in both cases, controlled experiments and clinical appraisals show that exposure to oxidant and ozone concentrations could have serious health effects. Results from a number of controlled human exposure to ozone studies are given in Table 24.

Effects on Vegetation

Oxidant injury to vegetation was first identified in 1944 in the Los Angeles basin. The understanding of oxidant effects and of the widespread nature of their occurrence has increased steadily since then. Observed effects on plant life include visible foliar injury and discoloration, increased leaf drop, reduced plant vigor, reduced plant growth, and death.

Biological effects occur not only in individual plants but also in plant communities and entire ecosystems. The implications of oxidant exposure to agricultural crops are dramatic.

- Field experiments compared yields of crops grown in clean air and air with typical ozone concentrations. These experiments showed up to 50% decreases in citrus yield; 10%-15% suppression in grape yield in the first year and 50%-60% reduction over the following two years; and a 5%-29% decrease in yield of cotton lint and seed in California.
- Losses of 50% in some sensitive potato, tobacco and soybean cultivars have been reported in the eastern United States.
- Reductions in yield, with little accompanying injury, have been noted for several crops. Severe injury was required to cause reduction in tomato yield. Chronic exposures to ozone at .05 to .15 ppm for 4 to 6 hours per day produced reductions in yield in soybean and corn grown under field conditions. The threshold concentration for ozone appears to be between .05 and .10 ppm for sensitive plant cultivars.
- Adverse effects of short-term exposure to ozone have been noted at the following levels and durations:

Trees and shrubs:	.2 to .51 ppm for 1 hour duration
	.2 to .25 ppm for 2 hours duration
	.06 to .17 ppm for 4 hours duration
Agricultural crops:	.2 to .41 ppm for .5 hour duration
	.1 to .25 ppm for 1 hour duration
	.04 to .09 ppm for 4 hours duration

Table 23. SUMMARY OF SELECTED DATA ON OCCUPATIONAL EXPOSURE OF HUMANS TO OZONE

Ozone, ppm	Subjective complaints	Clinical findings attributed to ozone	Measurements of pulmonary function	Other comments
0.25	None	None	None	-
0.3 to 0.8	Chest constriction and throat irritation in 2 to 4 subjects	None	None	-
0.2	-	None	None	-
0.8 to 1.7	Dry mouth and throat, irritation of nose and eyes, disagreeable smell in 11 of 14 subjects	None	None	Concentration of trichloroethylene up to 238 ppm found
0.2 to 0.3	Irritating odor, soreness of eyes, and dryness of mouth, throat, and trachea in 1 of 7 subjects	None	VC decrease in 3 of 7 subjects. FRC decreased in 2 of 7 subjects. DLCO decreased in 1 of 7 sub- jects.	All decreases in pulmonary function measurements were small. All sub- jects were smokers.
0.4	Discomfort and irritation in about 30 minutes	None	None	-
0.47	Distinct irritation of mucous membranes	None	None	-

Source: U.S. Environmental Protection Agency, "Air Quality Criteria for Photochemical Oxidants and Oxidant Precursors," Volumes I-II, DRAFT NO. 1, September 1977.

Table 24. SUMMARY OF SELECTED DATA ON HUMAN EXPERIMENTAL EXPOSURE TO OZONE

Ozone, ppm	Length of exposure	No. and sex of subjects	Subjective complaints	Measurements of pulmonary function	Other comments
0.2	3 hr/day 6 days/wk, for 12 wk	6 male	None	VC: no change FEV _{1.0} : no change	0.66 upper respir- atory infections/ person in 12 weeks. Control group had 0.95 in the same period
0.5	3 hr/day 6 days/wk, for 12 wk	6 male	No irri- tating sym- toms but could de- tect ozone by smell	VC: slight decrease but not significant decrease toward end of 12 weeks. Returned to normal within 6 weeks after exposure.	0.80 upper respir- atory infections/ person in 12 weeks
0.1	1 hour	4 male		Airway resistance: mean increase 3.3% at 0 hours after exposure (1/4 sub- jects showed an in- crease of 45%)	One subject had history of asthma, and experi- enced hemoptysis 2 days after 1 ppm
0.4	1 hour	4 male	Odor	Airway resistance: mean increase 3.5% at 0 hours after exposure (1/4 sub- jects showed an in- crease 12.5% 1 hour after exposure	

Table 24. (Continued) SUMMARY OF SELECTED DATA ON HUMAN EXPERIMENTAL EXPOSURE TO OZONE

Ozone, ppm	Length of exposure	No. and sex of subjects	Subjective complaints	Measurements of pulmonary function	Other comments
0.6	1 hour	4 male	Odor	Airway resistance: mean increase 5.8% at 0 hour after ex- posure (1/4 subjects showed an increase of 75%), mean in- crease 5% 1 hour after exposure	

Source: U.S. Environmental Protection Agency, "Air Quality Criteria for Photochemical Oxidants and Oxidant Precursors," Volumes I-II, DRAFT NO. 1, September 1977.

- According to a 1975 report by the State Department of Food and Agriculture, certain crops are no longer grown in the Bay Area because of air pollution. Among these crops are snap dragons and chrysanthemums.
- In the Bay Area ornamental growers have relocated their greenhouses from San Francisco to Half Moon Bay. Similarly, rose growers have moved to Salinas to avoid air pollution damage.
- According to recent surveys by the State Department of Food and Agriculture, crops seriously damaged in the Bay Area are grapes, carnations, and orchids.
- Estimated loss to cut flower growers in the Bay Area in 1970 was approximately \$1 million.
- Estimates of total annual statewide agricultural damage from air pollution have ranged widely from tens of millions of dollars to almost a half billion dollars. While much of this damage occurs in the Los Angeles and San Joaquin Valley areas, a significant portion also occurs in the Bay Area.
- The available data would suggest annual agricultural damage in the Bay Area from oxidant air pollution may range from several million dollars upwards to tens of millions of dollars.

It is clear that trees, shrubs and agricultural crops are affected by the levels of oxidant air pollution which occur in the Bay Area. It can therefore be concluded that a reduction in oxidant levels can have a very significant beneficial effect on plant life.

Effects on Materials

Just as with humans or plant life, air pollution can have negative effects on man-made materials. Ozone can accelerate the aging of rubber products and can cause dye fading in clothes, carpeting and other textiles. It can reduce the life of industrial maintenance points and vinyl and acrylic coil coatings. Textile fibers can also be damaged by ozone, resulting in accelerated aging.

The cost of such materials damage takes two forms. There is the cost to the producer who must take preventive measures to protect the product from ozone damage. There is also the costs to consumers. The consumer pays for such damage through earlier replacement of materials. For example, one study estimated the national cost of ozone fading--e.g. nylon carpets, permanent-press garments, acetate and triacetate textiles--to be approximately \$80 million annually.

Figure 29 presents a summary of the estimated total annual per capita cost of ozone damage and preventive measures as a function of annual ozone concentrations. In 1974, the annual average ozone concentration in the Bay Area was between .015 and .025 ppm. Thus, Bay Area residents paid between \$10 and \$33 million as a result of ozone damage to materials that year. By the year 2000, all other factors being equal, that cost will have risen to between \$12 and \$39 million per year in 1975 dollars.

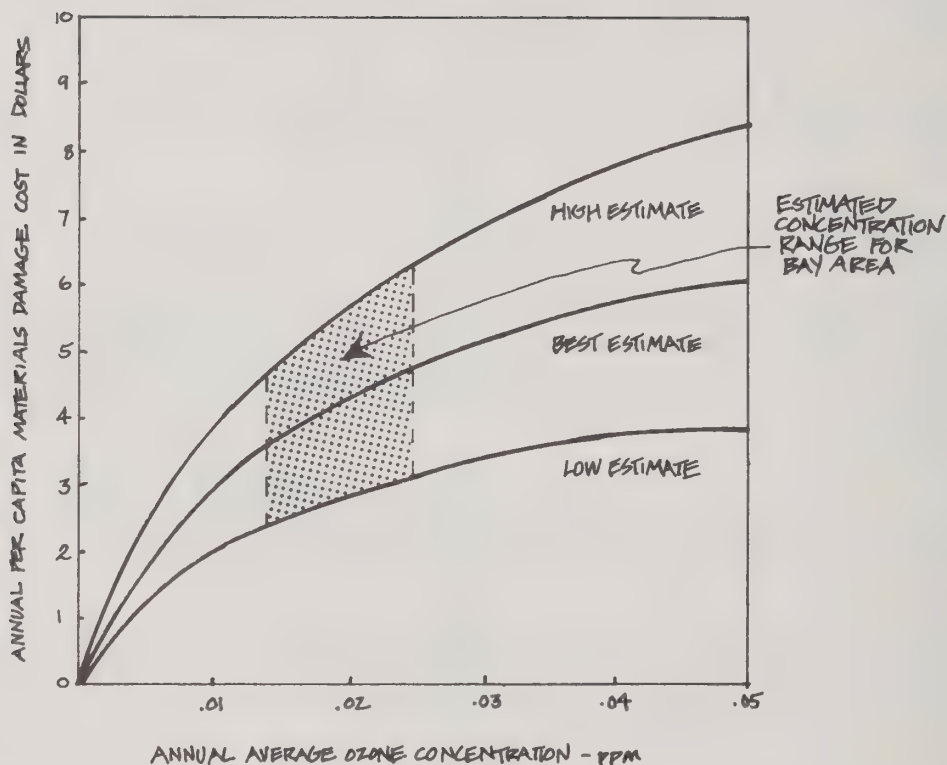


FIGURE 29.

EFFECT OF ANNUAL AVERAGE OZONE CONCENTRATION ON ADDED COSTS DUE TO DAMAGE TO MATERIALS AND PREVENTIVE MEASURES

The benefits to be realized from a significant reduction in oxidant levels may not always be quantifiable, but they are clear nevertheless. Air pollution has been found to have significant and negative effects on human health, plant life and materials. Maintenance of air quality standards thus plays a critical role in reducing the damages now experienced.

THE DIRECT COSTS OF THE PLAN

Section G of this chapter describes the AQMP proposals. A summary of the annualized costs for the control measures was also included. These costs have been broken down to capital, operation and maintenance, and administrative/regulatory costs. Several programs would generate revenues to offset the costs of other proposals. These have been noted. Details explaining how the annualized cost estimates were derived are given in Appendix B. This section briefly summarizes the direct costs needed to carry out the plan.

Stationary Source Control Costs

The major cost for additional stationary source controls would be for meeting best available control technology requirements. It is estimated this would cost about \$18 million annually. Most costs would be borne by private industry for capital outlays and higher operating and maintenance costs. An increase in public sector expenditures is also estimated for increased administrative and regulatory costs. These latter costs are estimated to be about three percent (or approximately \$530,000) of the costs of this program.

For private industry, slightly more than half of the costs are increased operating and maintenance expenses, which are recurring costs. The capital outlay requirements of approximately two hundred million dollars would be expended in the early 1980s if the plan were carried out as scheduled.

No direct costs are associated with continued implementation of the New Source Review rule. It is acknowledged this program will mean increased cost to industry for emission offset purchases. Since a form of this regulation has been in effect for a number of years, the administrative and regulatory costs are already budgeted for by the Bay Area Air Pollution Control District.

Mobile Source Control Costs

The annualized costs for additional mobile source controls is approximately \$50 million for the Bay Area. These costs would pay for three different programs. About half of the \$50 million is estimated to be the added per vehicle costs for cars and trucks which meet more stringent exhaust emission standards. The additional cost per vehicle would likely range between \$200 and \$400, assuming that a new engine technology is used to meet both the more stringent emission standards and Federal fuel economy standards. It has been assumed that these cars would be produced for all of California at a minimum, and possibly in a few other states with severe air pollution.

The vehicle inspection and maintenance program would cost about \$20 million annually. This cost includes a \$5 per vehicle inspection fee and an average repair cost of \$45 per vehicle, both paid by the vehicle owner. The \$5 inspection fee will cover the costs of acquiring land, constructing inspection facilities, equipment, and operation of the facilities. An additional aspect of the program would be that no vehicle owner would be required to spend more than a given amount (e.g., \$75) on repairs related to emission control.

The retrofit of heavy-duty gasoline powered trucks with exhaust catalysts is estimated to cost \$340 per vehicle, or a total annualized expenditure of \$1.5 million for the region. This cost includes a 50,000 mile replacement warranty. The slight increase in operating cost due to the use of unleaded gasoline will be offset by a slight improvement in fuel economy.

Transportation Control Costs

Costs associated with the transportation control recommendations are more complex than the costs for stationary and motor vehicle emission controls. In many cases a redistribution of money within the region is the net result. There are many hidden subsidies given to the use of the private automobile including a variety of public services (judicial system, coroner, fire department, on street parking, city planning, and other services typically financed from property taxes), and local ordinances which require parking to be provided by residential, commercial, and industrial developments. Because these subsidies are not structured on a "user pays" basis, there are existing inequities in the way transportation systems are financed. The current use of bridge tolls to support transit service improvements could be viewed as a redistribution of subsidies from one transportation system to another. Increased transit service as proposed by this plan for the period to 2000 is estimated to cost \$31 million annually, paid for, in substantial part, by additional Federal and State operating assistance. Additional transit service might be needed for maintenance of the standard after 1990.

The costs associated with the carpool incentive programs (preferential parking, bus/carpool lanes on freeways with ramp metering, and an expanded carpool matching program) total about \$9 million annually. The bulk of these costs are due to construction requirements for the bus/carpool lanes and ramp meters.

Finally, the cost of implementing a comprehensive system of bicycle paths and storage facilities is estimated to be approximately one-half million dollars per year. It was assumed that the paths would be striped onto existing roadways where the additional road width required would be accommodated by narrowing existing vehicle lanes.

Cost-Effectiveness of AQMP Recommendations

The cost-effectiveness of the various AQMP recommendations can be generally estimated in terms of the cost per ton of hydrocarbon emissions prevented, as summarized below:

- o The stationary source control recommendations would cost between \$200 and \$1000 per ton of hydrocarbon emission reduced, depending on the cost assumptions employed.*

*According to the cost conventions used for all control measures and described in Appendix B, the cost-effectiveness of stationary source controls would range from \$200 to \$300 per ton. However, stationary source control costs are (1) heavily weighted toward capital outlays for control facilities, which (2) have a shorter useful lifetime than assumed for all control measures (10-15 years rather than 25 years). Using these latter assumptions, the cost-effectiveness would be approximately \$1000 per ton.

- o The motor vehicle emission control recommendations would cost approximately \$1000 per ton of hydrocarbon emissions reduced.
- o The transportation recommendations would cost approximately \$20,000 per ton of hydrocarbon emissions reduced.

These estimates would indicate to some what the priority for implementation of the various recommendations should be. Stationary source controls are clearly the most cost-effective within the time frame of this plan. The land use and transportation recommendations would appear to be relatively expensive; however, this conclusion is also only valid during the time frame of this plan. The effectiveness of implementing transportation recommendations is expected to increase with time beyond the year 2000.

Section-J

FUTURE WORK AND RESEARCH NEEDS FOR THE CONTINUING PLANNING PROCESS

In developing this initial air quality plan a number of future tasks and research needs have been identified. As described in Chapter IX, the air quality plan would be updated annually as part of the updated Environmental Management Plan. The continuing planning process to be established in the region will provide the appropriate forum for doing this work. The work may be categorized as follows:

- Data collection needed to support additional control programs
- Additional air quality analyses to support additional control programs
- Control strategy development and assessment for carbon monoxide, oxides of nitrogen, total suspended particulates, sulfur dioxide, and other pollutants as necessary
- Monitoring implementation of the initial plan
- Development of a procedure for updating the plan

Requirements for additional data collection, air quality analysis, and control strategy development are summarized in Table 24 by pollutant.

IMPLEMENTING AND REFINING THE PHOTOCHEMICAL OXIDANT PLAN

A number of tasks must be pursued to ensure that the elements of the initial AQMP are being implemented. In addition to the specific actions identified for each governmental agency in the plan, the eventual programs implemented and their performance records must be monitored and related to what was called for in the plan. Certain programs may in practice turn out to be either more or less effective than what was estimated in the plan. If that should occur, the plan would need to be modified to account for the difference. In particular, the need for New Source Review and Indirect Source Review programs could be reevaluated accordingly.

With respect to the recommended Indirect Source Review program, a Memorandum of Understanding between the Bay Area Air Pollution Control District, the Metropolitan Transportation Commission, and the Association of Bay Area Governments should be executed to initiate that program.

In addition to tasks which follow-up on the initial AQMP, other technical tasks should be undertaken to address the impact of Bay Area pollution on other parts of the State. In particular, the feasibility of extending the LIRAQ modeling analysis to cover larger areas should be investigated along with other alternatives. If an appropriate analysis technique can be developed, the impacts of different levels of NO_x emissions in the Bay Area on other air basins should be tested. Once the role of Bay Area NO_x emissions on neighboring regions is identified, appropriate control measures can be developed if necessary.

TABLE 25. SUMMARY OF FUTURE WORK FOR THE CONTINUING PLANNING PROCESS

POLLUTANT	ADDITIONAL DATA COLLECTION	ADDITIONAL AIR QUALITY ANALYSES	CONTROL STRATEGY DEVELOPMENT	MONITORING IMPLEMENTATION AND COMPLIANCE
PHOTOCHEMICAL OXIDANT	Meteorological and emissions data for long range transport analysis.	Long range transport analysis and testing of spatially variable controls.	As needed	<ul style="list-style-type: none"> o Plan update o Execute Memorandum of Understanding on Indirect Source Review o Monitor and evaluate implementation of other control programs.
CARBON MONOXIDE	<ul style="list-style-type: none"> o Meteorological data for a max. CO day o Motor vehicle emission factor revisions 	Detailed modeling of several localized CO "hot spots."	As needed	As needed
NITROGEN DIOXIDE	Meteorological data for a max. NO ₂ day	LIRAQ modeling analysis to test effectiveness of existing control programs.	As needed	As needed
TOTAL SUSPENDED PARTICULATES	Implement more sophisticated monitoring equipment and chemical analysis techniques.	Further refinement of the chemical mass balance technique.	As needed	As needed
SULFUR DIOXIDE	Meteorological data for worst case SO ₂ /Ox/particulate day.	Develop forecasting analysis techniques to address State standard.	As needed	As needed
OTHER STATE POLLUTANTS	<ul style="list-style-type: none"> o Establish continuous monitors for ethylene o Develop emission inventories for lead and ethylene 	<ul style="list-style-type: none"> o Develop a model for sulfates o Evaluate the effectiveness of existing controls on lead 	As needed	As needed

TASKS LEADING TO A CARBON MONOXIDE PLAN

The most critical ingredient to developing a carbon monoxide plan is to obtain policy agreement between the Environmental Protection Agency and the California Air Resources Board on future motor vehicle CO emission factors appropriate for use in California. A divergence of technical opinion exists at this time which affects whether or not a problem exists and whether controls need to be pursued in the Bay Area. Several of the control measures currently being recommended for oxidant control will contribute substantially to reducing CO problems in the region. The analysis of whether those measures are sufficient to meet and maintain CO standards depends on the resolution of the emission factor issue.

Once an appropriate set of emission factors is developed, detailed air quality modeling studies of CO "hot spots" across the region (e.g., downtown San Jose) may be conducted, and the need for additional control programs determined. If necessary, specific traffic and transportation controls will be tailored to meet the CO standards in each "hot spot" location.

In order to satisfy federal regulations, the California Air Resources Board would also have to designate the Bay Area as an Air Quality Maintenance Area for CO before federal funding could be used to develop a CO plan.

TASKS LEADING TO A NITROGEN DIOXIDE PLAN

Available evidence suggests that current violations of the State one-hour NO₂ standard may be primarily due to motor vehicle emissions. If so, the California Air Resources Board's existing motor vehicle control program may be sufficient to meet and maintain the State standard through the year 2000. To verify this hypothesis, meteorological data conducive to the buildup of high NO₂ concentrations would have to be developed for input to a detailed modeling analysis (e.g., using LIRAQ). A model verification analysis would have to be performed, and appropriate changes expected in NO_x emission levels would have to be tested. If the analysis suggests that additional controls would be required to meet the State NO₂ standard, then alternative control measures would be developed and assessed.

Additionally, the 1977 Clean Air Act calls for the setting of a new federal NO₂ standard for an averaging time no greater than three hours, if deemed appropriate by the EPA Administrator. If and when such a standard is promulgated by federal regulation, prospects for attainment and maintenance of that standard in the Bay Area will be assessed, and appropriate control measures developed as necessary.

TASKS LEADING TO A PLAN FOR TOTAL SUSPENDED PARTICULATE MATTER

In developing the initial AQMP, a preliminary analysis was made of the nature of the particulate problem in the region. In particular, an attempt was made to identify sources responsible for the problems. The analysis met with limited success because of specific deficiencies in the available data base. For example, a large fraction of the particulate matter currently measured consists of some form of organic matter. The fraction which is natural, e.g. insect

parts and pollen, versus that which is man-made such as soot and photochemical aerosols is unknown at this time. In addition, the portion of particulates due to background windblown dust versus what may be due to specific industrial or other human activity cannot be distinguished.

Rather than develop a plan based on indiscriminate controls over particulate emissions which may or may not contribute to the problem, a program for obtaining the necessary data has been developed. The program consists of the purchase, installation, and maintenance of advanced particulate monitoring equipment, as well as sophisticated chemical analysis of the particulate samples obtained. Funding required to support the expanded particulate sampling program is estimated to be \$500,000 over a three year period. Once the appropriate data are collected, the specific source categories responsible for elevated particulate levels in the atmosphere may be more clearly identified. Control strategies appropriate to the sources implicated would be developed and assessed.

TASKS LEADING TO A SULFUR DIOXIDE PLAN

As stated previously, the federal sulfur dioxide standard is not currently violated in the Bay Area, nor are future violations expected at this time. The basis for the original designation of the Bay Area as an SO₂ maintenance area is uncertain. It clearly needs to be reexamined. Unless the California Air Resources Board can provide a sound technical analysis to support the previous designation, it should be withdrawn.

The SO₂ standard recently adopted by the California Air Resources Board (.05 ppm SO₂ for 24 hours) is more complex than the federal standard in that it requires a simultaneous violation of either the State oxidant standard (.10 ppm for one hour) or the State particulate standard (100 µg/m³ for 24 hours) at the same monitoring location.

If applied in 1975, this standard would have been violated once in the Bay Area. It is not possible at this time to forecast whether future violations will occur in the region because there is no known analytical technique for making such a forecast. Ambient sulfur dioxide levels will increase substantially by 1985; however, if the Comprehensive Strategy is implemented, the State oxidant standard will be met by 1985. In addition, the State 24-hour particulate standard is most often violated in areas where there are no significant sources of sulfur dioxide emissions (i.e., Livermore, San Jose, and Fremont).

The future task for the continuing planning process is to develop methods for forecasting simultaneous violations of State standards as prescribed. Once these methods are developed and tested, alternative control measures can be developed if necessary.

OTHER STATE POLLUTANTS

As part of the initial AQMP planning effort, available data concerning a number of other pollutants was reviewed. The pollutants are lead, sulfates, hydrogen

sulfide and ethylene, and the California Air Resources Board has adopted ambient air quality standards for each of them. In order to develop a plan to meet those standards a substantial body of information must be compiled. This information includes:

- ambient monitoring data to decide whether standards are being exceeded
- emission inventory data to identify the sources and amounts of emissions
- alternative control techniques for reducing the emissions
- an appropriate emissions/air quality relationship to identify existing problems and to project future ones
- an analysis of whether proposed controls will be effective in eliminating the current and projected future problems

Lead

The information needed to prepare a plan for the attainment of the State lead standard can be compiled. It is quite probable that the existing controls on lead content of gasoline for new catalyst equipped vehicles will result in eliminating future lead problems. An analysis of this problem (or lack of one) should be conducted.

Sulfates

The State sulfate standard has been violated once over the past eight years in the Bay Area. Projected reductions in the availability of low sulfur fuels (e.g., natural gas) will result in increased sulfur dioxide emissions, and thus may result in increased sulfate levels. On the other hand, decreases in oxidant levels may also result in lowered sulfate levels. The task for the continuing planning process is to develop and implement a technique for projecting future sulfate levels to determine whether the State standard will be violated in the region. There is no reliable technique available at this time.

Hydrogen Sulfide

Existing BAAPCD regulations address the State standard for hydrogen sulfide and are currently being enforced. No additional plans or control programs appear necessary at this time.

Ethylene

Analysis of this pollutant is limited by the lack of ambient monitoring data and emission inventory data. Without ambient monitoring data, it is not possible to determine whether a problem exists. Future efforts for ethylene, therefore, require that a continuous monitoring program be implemented for that pollutant.

ORGANIZATION FOR THE CONTINUING PLANNING PROCESS

Section C of this chapter described how the AQMP was prepared. Of particular importance was the formation and work of the AQMP Joint Technical Staff, composed of staff members from ABAG, BAAPCD, MTC, CARB (in-kind services) and Caltrans (in-kind services). In addition, the Interagency Management Committee (ABAG, BAAPCD and MTC), AQMP Advisory Committee, Program Review Board, Air Quality Modeling Committee, and various consultants all played important roles in the preparation of this plan.

Future organization for the continuing planning process should build upon the success of the working relationships established. It should also provide for continued planning needs as previously identified and a program to monitor progress and implementation of the recommended actions. As an important part of the environmental management program in the Bay Area, the AQMP organizational structure also needs to continue addressing related water quality and solid waste management issues.

Organization for the continuing planning process must address three important functional areas:

- Staff work and analysis to develop additions, revisions, and updates to the plan, i.e. the AQMP Joint Technical Staff
- Policy guidance to the staff, e.g. the present Environmental Management Task Force
- Agreements for implementation, monitoring and enforcement of the plan

For each area cited, a number of options are possible. The EMTF Plan Implementation Committee has already discussed a wide variety of options for how the entire environmental management program should be updated, including the AQMP. Similarly, the BAAPCD Board of Directors has adopted a position on how the continuing planning process should be structured.

The Clean Air Act of 1977 also speaks to how such plans should be prepared. Under Section 174 of the Clean Air Act of 1977, entitled "Planning Procedures,"

"(a) Within six months after the enactment of the Clean Air Act Amendments of 1977, for each region in which the..., standard for carbon monoxide or photochemical oxidants will not be attained by July 1, 1979, the State and elected officials of affected local governments shall jointly determine which elements of a revised implementation plan will be planned for and implemented or enforced by the State and which such elements will be planned for and implemented or enforced by local governments or regional agencies, or any combination of local governments, regional agencies or the State....the implementation plan...shall be prepared by an organization of locally elected officials of local governments...and certified by the State for this purpose...Where feasible, such organization shall be the metropolitan planning organization...or the organization responsible for the air quality maintenance planning process...or the organization with both responsibilities."

During the development of the draft plan, it was assumed that the organization for the continuing planning process would proceed logically from that used for developing the initial AQMP. In April 1978 ABAG was designated by the Air Resources Board as the lead agency for the preparation of the Bay Area's non-attainment plan required under the 1977 Clean Air Act Amendments. Shortly after the General Assembly, ABAG, the BAAPCD and MTC executed a three-way memorandum of agreement for cooperative planning under the 1977 act. The memorandum serves as the basis for organizational cooperation to prepare the non-attainment plan.

Section-K

BIBLIOGRAPHY OF TECHNICAL MATERIALS

In the course of developing the Air Quality Maintenance Plan, numerous documents were written to describe the many issues and technical aspects of the plan. These have taken several forms:

- historical/background information
- technical memoranda
- issue papers
- briefs
- other technical support materials

Background reports describe the history air quality planning in the Bay Area and the role of the AQMP in this context. Technical Memoranda generally focus on a single topic and contain the assumptions and methodology for deriving quantitative information, e.g., emissions inventories, costs, control measure effectiveness. Issue papers contain discussions of issues for which there are several plausible alternative options. Where appropriate, these papers describe the reasoning behind the final, selected course of action. Briefs are status reports concerning the progress of the technical work written in popular language for the benefit of the general public. A variety of technical support materials relevant to AQMP development were obtained from other ABAG planning programs and/or other agency research efforts.

BACKGROUND

- "Summary of the Air Quality Maintenance Plan Work Program for the Bay Area Joint Technical Staff," November 1976.

This report describes the background, objectives and schedule for development of the Air Quality Maintenance Plan (AQMP). A joint air quality planning team with representatives from the appropriate regional agencies will perform the tasks of prediction and analysis, impact assessment, plan formulation and technical assistance in plan adoption process.

- "History of Air Quality Planning in the Bay Area," February, 1976.

This report describes the development of governmental agencies and programs to deal with the air quality problems of the Bay Area. The Bay Area Air Pollution Control District is the local agency with direct control over polluting activities (primarily

stationary sources). The California Air Resources Board was established in 1967 to deal with the state's air pollution problem. Transportation Control Plans for reduction of auto-related pollutants are developed by the Metropolitan Transportation Commission (for the Bay Area only). In May, 1975 the Association of Bay Area Governments was designated as the lead agency to develop an areawide waste treatment management plan under section 208 of the Federal Water Pollution Control Act Amendments of 1972. This plan encompasses air quality as well as water resources and solid waste planning.

AQMP/TECHNICAL MEMORANDA

- Air Quality Maintenance Plan Technical Memorandum 1, - "Base Year Selection and Technical Assumptions," September, 1976.

This report describes the base year selection process, and the technical assumptions for developing the stationary and mobile source inventories and the air quality model.

- Technical Memorandum 2, - "Projections/Forecasting: System Description and Technical Assumptions," December 1976.

This memorandum describes the air quality forecasting system which consists of three primary components: a) population, housing, employment and land use modeling system b) a travel demand modeling system and c) two air quality models (LIRAQ and Larsen).

- Technical Memorandum 3, - "Air Quality Past and Present," March, 1977.

This report presents a broad, regional perspective of the air quality problem. Annual summary maps based on 1975 data show the geographic variation of the five major pollutants and serve to identify the problem areas.

- Technical Memorandum 4, - "Status of Existing Controls Related to Air Pollution," March 1977.

This report summarizes the existing stationary source controls, motor vehicle emissions controls and transportation controls related to air pollution. Land use controls are also discussed although the relationship of policy to air quality is not clearly defined.

- Technical Memorandum 5, - "Candidate Control Measures," April 1977.

This report builds on Technical Memorandum 4 and presents a wide range of candidate controls for achieving air quality standards.

- Technical Memorandum 6, - "The AQMP: Legal Requirements," July, 1977.

Federal Clean Air legislation requires that air quality maintenance plans be developed for areas expected to exceed the National Ambient Air Quality Standards. This report briefly highlights the substantive and procedural regulatory requirements needed for an AQMP in the San Francisco Bay Area.

- Technical Memorandum 7, - "Development and Analysis of Alternative Air Quality Strategies," July 1977.

This report describes the way in which air quality strategies, which are comprised of combinations of candidate control measures, are modeled via the forecasting system described in Technical Memorandum 2.

- Technical Memorandum 8, - "Summary of the Technological Forecast for Motor Vehicle Emission Control," July 1977.

The results of a technology questionnaire on future developments in vehicle emission controls are presented in this report, along with the consequent planning assumptions for modeling future vehicle emissions.

- Technical Memorandum 9, - "Summary of Technology Forecast for Organic Solvents Emissions," July 1977.

The results of a technology forecast questionnaire on the decreasing use of organic solvents in surface coating operations are presented in this report. Predictions on organic solvent content in the future and the nature of the new technologies are given.

- Technical Memorandum 10, - "Summary of Technology Forecast Questionnaire: Combustion Sources," August 1977.

This report gives the results of a technology forecast on the status of combustion emissions control e.g., fuel desulfurization, flue gas desulfurization, ammonia injection, combustion modification. It also presents up-to-date estimates of control efficiencies and costs.

- Technical Memorandum 11, - "Present and Projected Air Pollution Emissions in the San Francisco Bay Region," August 1977.

This report identifies the significant sources of five major air pollutants in the Bay Region in order to provide direction for efforts to control emissions. Emission inventories have been compiled for 1975, 1985 and 2000. The most significant source categories are organic compounds evaporation (HC), light and heavy duty vehicles (HC, NO_x, CO) and stationary source fuel combustion (NO_x, SO_x). There exists some difficulty in identifying the sources of particulate emissions - a significant unknown amount, is from windblown dust and secondary organics (photochemical aerosol).

- Technical Memorandum 12 - "Baseline Motor Vehicle Emission Inventory: Methodology and Results," August, 1977.

This report describes the methodology for calculating present and projected pollutant emissions from motor vehicles in the Bay Region. The methodology is designed not only to compute total daily emissions but also to distribute the emissions geographically and by hour of the day.

- Technical Memorandum 13, - "Benefits of Photochemical Oxidant Control," December, 1977.

The benefits to be gained from additional control of photochemical oxidants are described. These benefits are gained in three general areas: improvements in public health; reduction in damage to vegetation; and reduction in damage to other materials.

- Technical Memorandum 14, - "Effectiveness and Costs of Alternative Air Pollution Control Programs," September, 1977

This report presents the estimated costs and effectiveness of the proposed air pollution control measures. Key assumptions in the method of implementation, the timing and the estimation methodologies are given.

- Technical Memorandum 15, - "Assessment of Alternative Air Pollution Control Programs," January, 1978.

This report summarizes the effects of the AQMP in sixteen impact areas such as physical resources, equity, mobility and energy.

- Technical Memorandum 16, - "Institutional, Legal and Financial Requirements for Implementing Proposed Air Pollution Control Programs," September, 1977.

This report discusses the roles of the various participating agencies (Bay Area Air Pollution Control District, Association of Bay Area Governments, Metropolitan Transportation Commission, Department of Transportation) in the AQMP Program. Institutional structures needed to implement the majority of the proposed AQMP actions are in existence. The need for new legislation is minimal. Greater emphasis will be necessary on structuring the institutional arrangements for implementing the transportation and land use programs.

- Technical Memorandum 17, - "Baseline LIRAQ Air Quality Projections," September 1977.

Includes a description of baseline LIRAQ simulations. Meteorological and emission inventory input files are described along with a summary of the model results for 1975 verification analysis and 1985 and 2000 projections assuming existing growth trends and controls.

- Technical Memorandum 18, - "LIRAQ Emissions Sensitivity Analysis," September 1977.

Documents the procedures, assumptions and results of varying emissions on air quality projections. The objective was to provide clues to the design of control strategies and to address the issue of the degree of control needed to attain the oxidant standard.

- Technical Memorandum 19, - "Applicability of Selected Statistical/Empirical Techniques to Air Quality Analysis in the San Francisco Bay Region," September 1977.

Documents the procedures and results of attempts to apply the well-known Larsen Model and the recently developed EPA ozone isopleth technique (also known as the Empirical Kinetic Modeling Approach, EKMA) to the Bay Area. The Larsen Model was found to be generally applicable except for a few cases, while the isopleth technique was found not to be applicable based on a limited sample of Bay Area monitoring data.

- Technical Memorandum 20, - "Procedure for Interpretation of LIRAQ Air Quality Projections," September 1977.

Problems and techniques employed to relate LIRAQ projections to the ambient air quality standard for oxidants are summarized. Adjustment factors are derived for application to the regionwide high hour oxidant level forecasted by the model to account for worst case conditions and imperfect validations. Limitations of LIRAQ grid coverage are also discussed.

- Technical Memorandum 21, - "Geographical Distribution of Emissions from Non-Major Point (Area) Sources," October 1977.

This memorandum describes the process and data used to characterize the spatial distribution of stationary area source emissions for LIRAQ modeling purposes. The cross-classification approach which was used is presented.

- Technical Memorandum 22, - "Regional Travel Projections for AQMP," November 1977.

This memorandum describes the methodology employed in preparing the regional motor vehicle travel projections used in developing the AQMP. A summary of vehicle miles travelled and vehicle trips for each case analyzed is also included with a discussion of the results.

- Technical Memorandum 23, - "Evaluation of Transportation Control Measures," November 1977.

This memorandum presents the methodology for evaluating and screening transportation control measures, as well as the results of the screening. Each alternative control measure is described and its potential effectiveness in reducing emissions is presented.

- Technical Memorandum 24, - "Analysis of Suspended Particulate Matter in the San Francisco Bay Region," November 1977.

This memorandum describes the results of applying a chemical mass balance technique for identifying source-receptor relationships for suspended particulate matter in the region.

AQMP/ISSUE PAPERS

- Issue Paper 1, - "Air Quality Modeling for the San Francisco Bay Region," September 1976.

This paper describes the selection of the appropriate air quality models for developing the AQMP. It describes the physical factors for model selection, the alternative models available, the criteria for model selection, and the recommended models. A description of the Lawrence Livermore Lab Regional Air Quality Model (LIRAQ) is included.

- Issue Paper 2, - "The Air Quality Modeling Process: Accuracy and Related Issues," May 1977.

This paper describes the process by which air quality models will be applied and interpreted in the AQMP. The main focus is on photochemical oxidant modeling since it presents the most severe problem in terms of modeling difficulties and anticipated control requirements.

- Issue Paper 3, - "Regional/Local Issues in Land Use Controls for Improving Air Quality."

This paper reviews the process by which land use controls have been examined in the AQMP. It presents the complete testing of land use control measures, the pertinent local, regional and state agencies having responsibility for each action and the effects of these measures on such criteria as projected auto travel, the acreage of developed land and transit usage.

AQMP BRIEFS

- Environmental Management Program, "Air Quality Maintenance Plan Brief No. 1 - The Goal, Future Decisions, Issues and Organization," March 1977.

Brief No. 1 describes the goal, key issues and program organization of AQMP. The goal is stated as being the attainment and maintenance of State and Federal air quality standards as expeditiously as practicable. The Statement of Issues seeks to resolve the differences between the State and Federal standards, to identify appropriate level of governmental responsibility for air pollution controls and to establish a schedule for delivery of the final product.

- "Air Quality Maintenance Plan Brief No. 2 - Alternative Air Quality Strategies," June 1977.

This Brief describes the existing air pollution control strategies, the candidate control measures, the format of the final product, and the progress and schedule.

- "Air Quality Maintenance Plan Brief No. 3 - Air Quality Problems," August 1977.

Brief No. 3 describes the past, present and future air quality problems in the Bay Area. The future air quality is projected assuming no additional control programs beyond those currently adopted. A preliminary estimate of the air pollutant emissions reduction required to achieve the program goal is given, along with an updated view of the final product.

- "Air Quality Maintenance Plan Brief No. 4 - Progress Report on Development of the Air Quality Maintenance Plan," October 12, 1977.

Brief No. 4 describes three key aspects of the AQMP: (1) Results of photochemical oxidant modeling activities conducted to date; (2) Requirements for meeting the 0.08 ppm Federal oxidant standard; and (3) Considerations for dealing with technical uncertainty.

OTHER TECHNICAL SUPPORT MATERIALS

- Association of Bay Area Governments, "Economic and Air Quality Impacts of New Source Review Regulations in the San Francisco Bay Area," prepared for the Bay Area Air Pollution Control District Board of Directors, November, 1977.

The purpose of this study is to assess the major impacts of alternative new source review regulations. The Air Pollution Control District staff prepared 12 possible changes in the new source review rule as currently embodied in BAAPCD Regulation 2, Section 1309.

Since the start of the study the Environmental Protection Agency has issued guidelines for new source review regulations, including emission offset policies. Interpretation of the guidelines would seem to preclude some of the alternatives. Yet the systematic examination of all the alternatives provided an important comparison of the effects of each option.

- Barton-Aschman Associates, Inc., "Sensitivity Analysis of Selected Control Measures: Potential Reductions in Regional Vehicle Miles of Travel," Memorandum #1 to the Metropolitan Transportation Commission, July 22, 1977.

The results of a mode-split sensitivity analysis conducted for 13 different transportation control strategies in the San Francisco Bay Area are described. Forecasts of 1985 mode-split changes for auto, transit, and shared-ride trips from the proposed strategies are estimated. Only home-based work trips were examined to obtain a sample of origin-destination districts across the region. Five different origin districts were identified, and trip interchanges between these districts and the San Francisco central business district (CBD), as well as an Oakland industrial area, were investigated. These two destinations were meant to represent CBD and non-CBD trips, respectively.

- Barton-Aschman Associates, Inc., "Sensitivity Analysis of Selected Transportation Control Measures: Potential Reductions in Regional Vehicle Miles of Travel," Memorandum #2 to the Metropolitan Transportation Commission, August 12, 1977.

A continuation of the work described in the July 22, 1977 memorandum cited above is reported. Potential changes in mode-split for auto, transit, and shared-ride trips identified in the July 22 memorandum are converted to an estimated range of impacts at the regional level. Elasticities of nine of the 13 individual transportation control strategies were plotted and normalized effectiveness indices are computed, for each of the three modes for CBD and non-CBD travel. Relative changes in each of nine transportation control strategies are reported. In addition, four combination transportation control strategies were also tested for their effect on mode choice for CBD and non-CBD trips.

- Bay Area Air Pollution Control District, "Emission Inventory Impact and Cost of Implementation of Proposed Stationary Source Controls," prepared for AQMP Joint Technical Staff by BAAPCD, August 14, 1976.

The report describes the potential emissions reductions from certain industrial categories that can be expected from a number of stationary source control options. These measures, four of which are recommended in the AQMP for stationary source emission controls, are described separately in the report. Estimated costs for the measures are also presented.

- Bay Area Air Pollution Control District, "Method of Projection," (Draft), May 31, 1977.

This report contains the Air Pollution Control District staff's methodology for estimating stationary source and aircraft emissions for the years 1975, 1985, and 2000.

- Bay Area Air Pollution Control District, "Emission Inventory Summary Report," August 18, 1977.

This document contains the Air Pollution Control District staff's estimates of stationary source and aircraft emissions for the years 1975, 1985, and 2000.

- W. Duewer, "Suggested Revision of the LIRAQ Hydrocarbon Emissions Inventory," Lawrence Livermore Laboratory UASG 77-6, prepared for the Air Quality Maintenance Plan - Joint Technical Staff, April 12, 1977.

This report describes two procedures for assigning hydrocarbon emissions to the three hydrocarbon reactivity utilized by LIRAQ. The first procedure is designed to convert detailed emissions by source type as provided by Trigonis, et al, into LIRAQ reactivity classes. The second is designated for use with the CARB adopted three hydrocarbon reactivity category system.

- J. Da Cunha, S. Cambell, V. Petrites, "Generation of 1975/85 Modal Split Ratios for Input to PLUM," memorandum to Modeling and Analysis Team, ABAG/MTC Joint Planning Program, Working Paper #27-Series 3, April, 1976.

The transportation related part of the Projected Land Use Model (PLUM) allocates employed residents from zone of work to zone of residence using both highway and transit travel time matrices. The proportion of employed residents allocated to zones of residence by each mode was done using the modal split ratio at the zone of work. This report describes the procedure used to take 1965 and calculated 1990 modal split ratios and interpolate them for 1975 and 1985.

- S. Chaitkin and H. Kollo, "Series 3 Highway Network (1965, 1975, and 1985) Inputs to PLUM," memorandum to Modeling and Analysis Team, ABAG/MTC Joint Planning Program, Working Paper #29-Series 3, August, 1976.

This working paper describes the assumptions used by the Metropolitan Transportation Commission (MTC) to develop the 1965, 1975, and 1984 440 zone matrices of travel times for the highway mode. These matrices were used by the ABAG/MTC Joint Planning Program for PLUM validation and projections. Discussed are the following characteristics of Series III highway networks for each of the three specified years: facility assumptions, speed/service level representation, supplementary travel time estimations, final preparation for input to PLUM and comparison of the resulting travel time estimations.

- S. Chaitkin and H. Kollo, "Series 3 Transit Network (1965, 1975, and 1985) Inputs to PLUM," memorandum to Modeling and Analysis Team, ABAG/MTC Joint Planning Program, Working Paper #30-Series 3, January, 1977.

This working paper describes the assumptions used by MTC to develop the 1965, 1975, and 1985 440 zone matrices of travel times for the transit mode. These matrices were also used by the ABAG/MTC Joint Planning Program for PLUM validation and projections.

Discussed are the following characteristics of Series III transit networks for each of the three specified years: facility assumptions, speed/service level representation, supplementary travel time estimations, final preparations for input to PLUM, and comparison of the resulting travel time estimations.

- J. Holtzclaw, "Projecting Migration in the San Francisco Bay Area," memorandum to Modeling and Analysis Team, ABAG/MTC Joint Planning Program, Working Paper #33-Series 3, August, 1976.

This working paper reviews methodologies for analyzing and projecting net migration into regions like the Bay Area. Continuing beyond ABAG's use of California Department of Finance projections in Series I and Series II, the findings of this report were used to guide the population and labor force migration projections in Series III.

- S. Hoffman, "General Description of Series 3 Projection System," memorandum to Modeling and Analysis Team, ABAG/MTC Joint Planning Program, Working Paper #36-Series 3, October 28, 1977.

This working paper describes the Series III projection system including: 1) the models that comprise the system and their inter-relationships; 2) their data inputs and projection outputs; 3) the major assumptions that control the projections; and 4) the relationship of the projections to the Environmental Management Program (EMP).

- Association of Bay Area Governments, "Summary Report - Provisional Series 3 Projections of Population, Housing, Employment, and Land Uses in the San Francisco Bay Region," March, 1977. (Final documentation available January, 1978.)

This report summarizes projections of population, housing, employment and land uses for the San Francisco Bay Region. Provisional Series III projections are presented for the nine county region through the year 2000. For counties and smaller areas of the region the projections are presented for the period through 1990.

- M.C. MacCracken and G.D. Sauter, Eds., "Development of an Air Pollution Model for the San Francisco Bay Area" - Final Report to The National Science Foundation, Vol. 1, Lawrence Livermore Laboratory, UCRL-51920 Vol. 1, Rev. 1, October, 1975.
- M.C. MacCracken and G.D. Sauter, Eds., "Development of an Air Pollution Model for the San Francisco Bay Area" - Vol. 2 Appendices, Lawrence Livermore Laboratory, UCRL-51920 Vol.2, October, 1975.
- M.C. MacCracken, "User's Guide to the LIRAQ Model: An Air Pollution Model for the San Francisco Bay Area," Lawrence Livermore Laboratory, UCRL-51983, December, 1975.

This User's Guide has been written to assist the potential user of the LIRAQ model to conduct numerical simulations at the Lawrence Berkeley Laboratory (LBL) Computer Center. Although the models have focused on simulation of Bay Area air quality, they have been designed so that transfer to other regions is possible.

- M.C. MacCracken, D.J. Wuebbles, J.J. Walton, W.H. Duewer, and K.E. Grant, "The Livermore Regional Air Quality Model: I. Concept and Development," Lawrence Livermore Laboratory, preprint UCRL-77475 Pt. 1, Rev. 2, August, 1977.

This and the following series of reports present the physical and mathematical basis for the Livermore Regional Air Quality (LIRAQ) model that has been developed for use in the San Francisco Bay Region. The model considers the complex topography, changing meteorology, and detailed source emission patterns in generating surface and vertical average pollutant concentrations with grid resolutions of 1, 2, or 5 km.

- W.H. Duewer, M.D. MacCracken, and J.J. Walton, "The Livermore Regional Air Quality Model: II. Verification and Sample Application in the San Francisco Bay Area," Lawrence Livermore Laboratory, preprint UCRL-77475 Pt. 2, Rev. 2, August 1977.

In this paper, topographic, meteorological, source emission and atmospheric pollution concentration data have been assembled for use in verifying the LIRAQ-1 and LIRAQ 2 regional air quality models in the San Francisco Bay Area. These observed data indicate that the temporal and spatial phasing for concentrations of carbon monoxide, ozone, and nitrogen oxides can be adequately represented by the models.

Limited sensitivity studies were also conducted with the LIRAQ models. The results indicate that initial and horizontal boundary conditions as well as grid size and subgrid-scale effects, while very significant in predicting air quality on the local scale, are less important in dealing with regional concentrations of pollutants than are emissions, meteorological conditions and vertical boundary conditions.

Section-L

AIR POLLUTION CONTROL COSTS

Air pollution control costs have been estimated for three different types of sources: stationary (e.g., industry), mobile (e.g., automobiles, trucks) and transportation (i.e., from vehicle miles of travel, traffic). Cost estimates are comprised of three components:

- capital construction costs
- operational and maintenance costs and revenue
- administrative/regulatory costs.

These costs will be expended over a period of time from 1977 to 2000 in accordance with a schedule of implementation (which varies with each recommendation).

The Bay Area Air Pollution Control District has estimated the costs of the recommended stationary source control measures in each cost category. The California Air Resources Board has similarly estimated costs for motor vehicle emission controls and the Metropolitan Transportation Commission has estimated costs for transportation controls. These estimates are shown in Table L-1. A breakdown of the costs for best available control technology (Action 3 in Table L-1) is presented in Table L-2.

In order to be able to compare the costs of alternative AQMP control recommendations, a cost assessment convention has been applied whereby the cost components are discounted and the resultant present values are converted into equivalent annual costs.* This convention has been established by the Environmental Protection Agency in the "Guidelines for State and Areawide Water Quality Management Program Development" and it has been applied by ABAG to the other management plans as well.

Expenditures for air pollution control do not necessarily occur in the year that the plan is implemented. Therefore, costs that are expended at a future time are discounted at a prescribed rate of 6 3/8% to obtain a present value. Discounting is a way to account for the opportunity cost of funds invested in a project in the sense that the funds could be invested in alternative ways. The present value represents the amount of funds that is required at the present time which, if invested at 6 3/8%, would be sufficient to finance the recommended control at some specified future time of implementation.

*The resulting equivalent annual costs are reported in the Section G plan summary table.

After discounting, the resultant present value costs are converted to a uniform schedule of payment over the period 1977-2000. This is the equivalent annual cost and is analogous to a monthly mortgage payment. All recommendation costs in the Environmental Management Plan are presented in this manner.

Discounting - The future costs of a control are discounted to the base year, 1977, according to the formula:

$$PV = \frac{TC}{(1 + R)^n}$$

where PV = present (i.e., discounted) value
 TC = the undiscounted cost incurred in a given year
 R = the discount rate = 6 3/8%
 n = the number of years beyond 1977 when the cost is incurred (n=0 for 1977, 1 for 1978, 2 for 1979, etc.)

This formula is applied to each year in which a cost is incurred. The resultant present values are summed to obtain a total present value.

Salvage Value - At the end of the planning period (1999) structures and equipment are assumed to have a salvage value based on the remaining functional life of the structure. The remaining life is computed according to a straight line depreciation over an assumed service life. The salvage value is subtracted from last year's costs.

Equivalent Annual Cost - The total present value costs are converted (i.e., amortized) to an equivalent annual cost according to the following formula:

$$EAC = \frac{TPV \times R}{1 - \frac{1}{(1 + R)^n}}$$

where EAC = the equivalent annual cost
 TPV = the total present value
 R = the discount rate = 6 3/8%
 n = the number of years in the planning period = 23

Base Year - All cost estimates are in 1977 dollars. The Engineering News Record for Construction Costs (ENRCC) index was applied in cases where current estimates were not available (see Table L-3).

Schedule for Implementation - Cost estimates (i.e., capital, operational/maintenance, administration/regulatory) were provided by the respective agencies with jurisdiction over the source type. An approximate time schedule for cost expenditures was subsequently developed for each control recommendation. This schedule (as shown in Table B-1) formed the basis for the discounting and annualizing computations.

ACTION	1			2			3			4			5		
	available control technology			New Source Review			new vehicle emission standards			inspection and maintenance			heavy duty vehicle retrofit		
	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R
1977															
1978															
1979															
1980															
1981															
1982															
1983	\$167M									\$18.6M	\$2.15M				
1984										"	1.75M				
1985		\$17M								19.7M	"				
1986		"								20.9M	"				
1987		"								"	"				
1988		"								21.7M	"				
1989		"								"	"				
1990		"					\$11.4M			"	"				
1991		"					22.2M			23.1M	"				
1992		"					32.4M			"	"				
1993		"					42.0M			"	"				
1994		"					51.0M			24.5M	"				
1995		"					59.4M			"	"				
1996		"					67.2M			"	"				
1997	91M						91.0M			26.0M	"				
1998		"					96.8M			"	"				
1999		26M					102.1M			"	"				
Economic Life (Years)	25														
Total Equivalent Annual Cost	\$18,000,000						\$24,913,000			\$18,287,000			\$1,542,000		

Notes: a) M = million

b) 1977 dollar base

c) C = capital construction costs

d) O/M = annual operating/maintenance costs and revenue

e) A/R = administrative regulatory costs

f) The economic life is stated for measures where capital construction costs are incurred. It is used to compute the salvage value of capital equipment at the end of the analysis period.

TABLE L-1 -- BASE AIR POLLUTION CONTROL COSTS

ACTION	7 preferential parking			8 additional transit			9 bus/carpool lanes & ramp metering on fwys.			10 carpool matching program			11 bicycle system		
	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R	C	O/M	A/R
1977															
1978															
1979												\$300,000			
1980		\$1M	\$30,000		\$15.8M	\$7.9M			\$139M			"			
1981		"			"	\$15.8M						"		\$300,000	
1982		"			"	23.7M						"		\$200,000	
1983		"			"	31.6M						"		"	
1984		"			"	39.5M						"		"	
1985		"			"							"	\$10M	"	
1986		"			"							"		"	
1987		"			"							"		"	
1988		"			"							"		"	
1989		"			"							"		"	
1990		"			"							"		"	
1991		"			"							"		"	
1992		"			"							"		"	
1993		"			"							"		"	
1994		"			"							"		"	
1995		"			"							"		"	
1996		"			"							"		"	
1997		"			"							"		"	
1998		"			"							"		"	
1999		"			"							"		"	
Economic Life					20			25		Life				Permanent	
Total Equivalent Annual Cost	\$886,000			\$31,000,000			\$7,438,000			\$300,000			\$438,000		

TABLE L-1 (Continued)

Table A-2. Breakdown of Costs and Hydrocarbon Emission Reductions by Process Category

BAAPCD Process Category	Emission Reduction (Tons/Day)		CONTROL COSTS ^a				BACT ^b
	1985	2000	1985		2000		
			CAP (\$ million)	O/M	CAP (\$ million)	O/M	
2 - Petroleum Refining - Other Processes ^c	16.9	22.3	\$10.	\$1.1	\$17.5	\$1.1	BM & PC
3 - Petroleum Refining - Upsets, Breakdowns	2.6	3.5	1.	.1	1.2	.12	BM & PC
9 - Other Chemical	2.6	3.1	1.5	.075	1.8	.09	incinerator, low-no solvent coatings, fume scrubbers
19 - Food/Agric. Processing	3.7	4.3	1.5	.075	1.8	.09	5, 6, 14, 16
23 - Storage & Blending	17.5	27.9					
24 - Marine Loading	5.4	8.2					
25 - Bulk Plants	.8	13.6	150.	7.5	250.	12.5	3
29 - Storage Tanks - Solvent	5.7	9.7					
30 - Storage Tanks - Other Organic Compounds	3.4	5.8					
31 - Industrial Coating Solvent	38.	52.					
32 - Industrial Coating - Water	.3	.5	58.	3.	70.	3.5	incinerator, low-no solvent coatings, fume scrubbers
33 - Com'l. & Dom. Coating - Solvent	19.	23.					
34 - Com'l. & Dom. Coating - Water	2.7	4.5					

Notes: a/2000 costs include those of 1985; 1975 dollar base

b/ ACT = available control technology
BM & PC = better maintenance and process changes

c/Costs for this source category are considered underestimates, due to difficulties in isolating the cost of BACT from other process and equipment changes which refineries may opt to implement simultaneously.

Table L-2 (Continued)

BAAPCD Process Category	Emission Reduction (Tons/Day)		CONTROL COSTS ^a				BACT ^b
	1985	2000	1985		2000		
			CAP (\$ million)	O/M	CAP (\$ million)	O/M	
35 - Degreasers	35.	42.	\$6.	\$.6	\$8	\$.8	absorption
36 - Dry Cleaners PERC	13.	30.	2	.2	5	.5	closed system with solvent recovery
38 - Rubber Fabrica- tion	4.7	5.	1.5	.2	1.8	.2	solvent re- covery
39 - Plastic Fabrica- tion	23.	28.	6	.6	7	.7	solvent re- covery
40 - Printing	9.	21.	2	.2	5	.5	absorption
41 - Other Or- ganics Evaporation	20.	39.	5	.5	9	.9	absorption
Total	226.8	329.1	\$243	\$14.	\$376.	\$21.	
1977 dollar base			\$229	17	462	26	

Notes: a/2000 costs include those of 1985; 1975 dollar base

b/ ACT = available control technology

BM & PC = better maintenance and process changes

TABLE L-3

ENGINEERING NEWS RECORD
CONSTRUCTION COST INDEX
(ENRCC)¹

Date		San Francisco ²	U.S.-20 Cities Average ²
January	1977	3100 ³	2494
May	1976	2824	2328
June	1975	2518	2205
July	1974	2287	2041
June	1973	2224	1896
July	1972	2074	1726
June	1971	1709	1575
June	1970	1515	1369
July	1969	1525	1283

¹Based on 1913 U.S. average = 100

²Numbers are rounded to tenths

³An ENRCC of 3100 is being used for the Environmental Management Plans.

Section-M

RESULTS OF THE

LIRAQ EMISSIONS SENSITIVITY ANALYSIS

This section is a more detailed description of the results of the LIRAQ emissions sensitivity analysis which was described briefly in Section F.

Table C-1 gives the result of holding constant the prototype meteorology, while varying the percent reductions in future year precursor emissions. Each column of the table corresponds to a different combination of percent reductions in hydrocarbon and nitric oxide emissions. The first five columns show zero for percent reductions in NO emissions, so results in these columns pertain to reductions in only hydrocarbon emissions, with the first column being simply the 1985 baseline results. The last two columns give results for simultaneous reduction in hydrocarbon and nitric oxide emissions. All results in Table 1 are for the same inventory year, 1985, and same prototype meteorology, July 26, 1973.

Table C-1, LIRAQ Emission Sensitivity Analysis Results

% Reduction HC	0	20	40	60	80	40	80
% Reduction NO	0	0	0	0	0	20	40
Expected worst-case regionwide high hour ozone (ppm)	.19	.14	.08*	.07	.06	.11	.06

* This value was rounded off from an original value of .0846 ppm.

Assumptions: 1) 1985 Baseline Emission Inventory
2) July 26, 1973 Prototype Meteorology

Figure C-1 is a plot of regionwide high hours versus percent reduction of the hydrocarbon only emissions. These curves allow a more precise interpolation of percent reduction in hydrocarbon only emissions to meet the standard. Figure C-1 shows the required number to be 43% on a worst case basis.

The sixth column of Table C-1 shows that the regionwide high hour for a 40% hydrocarbon emissions reduction simultaneous with a 20% nitric oxide emissions reduction is 0.11 ppm of ozone. This number is 0.03 ppm greater than the regionwide high hour for 40% only emission reduction. Figures C-2, C-3, and C-4 have been prepared to highlight this effect. Figure C-2 shows the east-west traverse AA' along which map ozone* has been plotted in Figure C-3. Figure C-2 is the baseline map

* "map ozone" is to be distinguished from "hourly averaged" ozone. The latter has been averaged over one hour in time. Map ozone is read directly from maps like Figure 2 and is not averaged over one hour.

for 1985 emissions and July 26, 1973 meteorology at 1500 PST, the hour when the highest map ozone occurred 9.5 kilometers SSE of Livermore. The section line AA' is through this point of maximum map ozone, as is the north-south traverse BB'. The curves labeled "baseline" in Figures C-3 and C-4 represent ozone cross-sections through this ozone "high", along traverses AA' and BB' respectively.

Similarly, for the 1985 inventory and July 26, 1973 meteorology, the other curves in Figures C-3 and C-4 represent ozone cross-sections along identical traverses AA' and BB' for LIRAQ map outputs obtained when the emissions input is reduced by 20% HC, 40% HC, 60% HC, 80% HC, and 40% HC/20% NO. Curve labels correspond to the various percent reductions.

The six curves in Figures C-3 and C-4 clearly show the geographic variation of the various percent reductions in precursor emissions. In particular the 40% HC/20% NO curve is shown to exceed the 40% HC only curve almost everywhere along the two cross-sections.

Subsequent to this initial series of sensitivity tests, an additional test consisting of no hydrocarbon emissions reduction and a 40% nitric oxide emission reduction was made. The result was a substantial increase in oxidant levels above the baseline level in upwind urban source areas, and a slight decrease from baseline levels in downwind non-urban areas. This result is highlighted in Figure C-5, which shows the results of the 40% NO reduction test relative to the other sensitivity tests conducted.

Example maps from the sensitivity analysis tests are shown in Figures C-6 through C-10.

Implications for Control Strategies

The main implications are:

- reduction of hydrocarbon emissions alone is more effective than joint reduction of hydrocarbon and nitric oxide emissions, for the percentages examined,
- "Nitric oxide quenching" is a likely explanation for this result,
- a 43% reduction of hydrocarbon emissions will attain the standard in 1985,
- by extrapolation of this 1985 result**, a 56% reduction of hydrocarbon emissions will attain the standard in 2000.

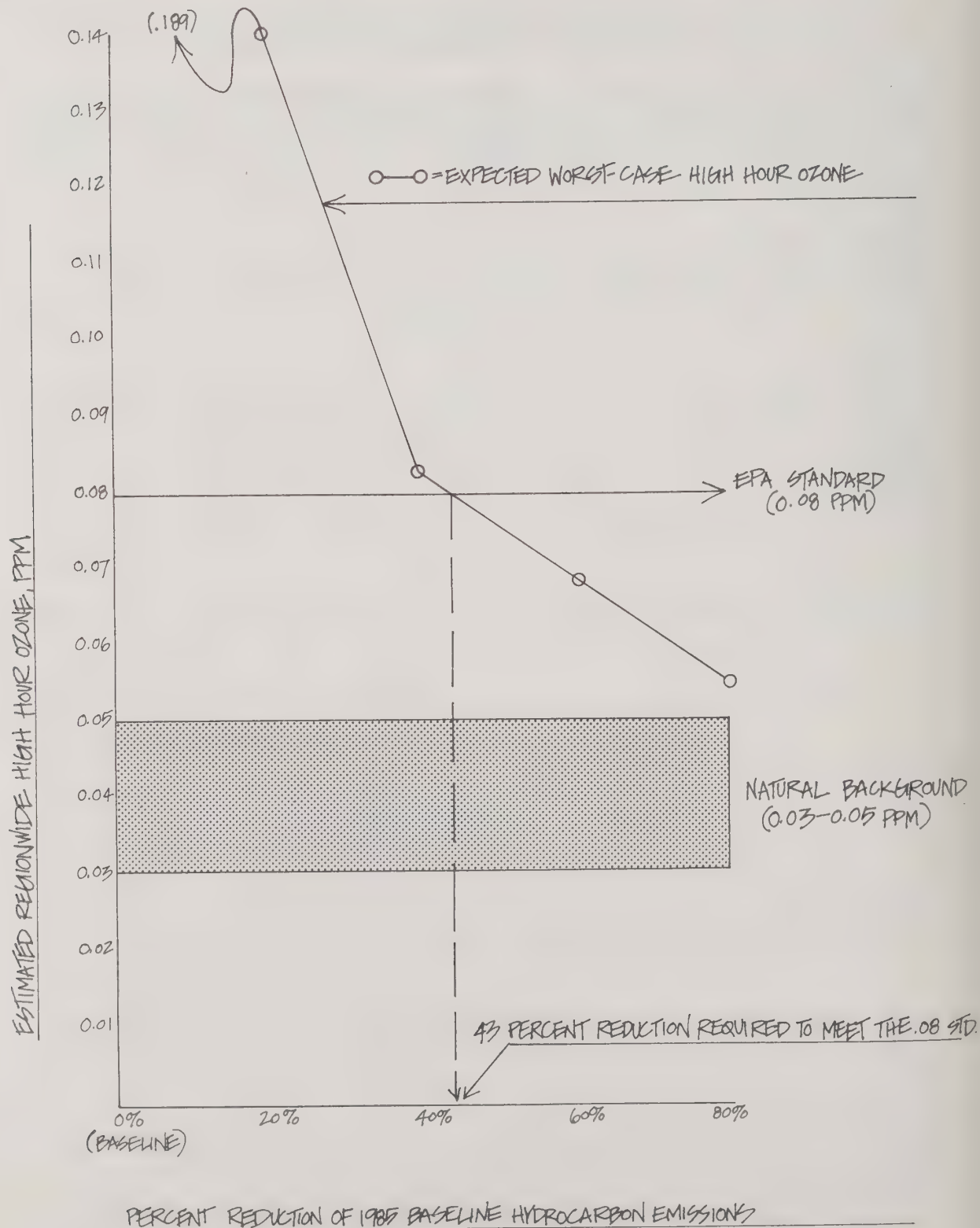
** The calculation is to apply the 43% reduction to total 1985 organic emissions. This leaves 1985 total organic emissions at approximately 450 tons/day. If a 56% reduction is applied to total 2000 organic emissions, the same remainder is obtained, 450 tons/day.

The conclusion should not be reached that maximizing NO_x emissions controls, to take advantage of NO quenching, is a viable strategy, for two reasons:

- a California standard presently exists for one hourly averaged nitrogen dioxide, which is exceeded in the region,
- the EPA is presently examining the criteria for a one to three hourly averaged nitrogen dioxide standard, in addition to the present annual average standard for nitrogen dioxide. EPA could issue such a standard in 1978.

FIGURE C-1.

PLOT OF ESTIMATED REGIONWIDE HIGH HOUR OZONE AS A FUNCTION OF % REDUCTIONS OF 1985 HC EMISSIONS



RE C-2



FIGURE C-3 EMISSION SENSITIVITY RESULTS COMPARED BY VARIOUS PERCENT REDUCTIONS ALONG SECTION AA' OF FIGURE C-2

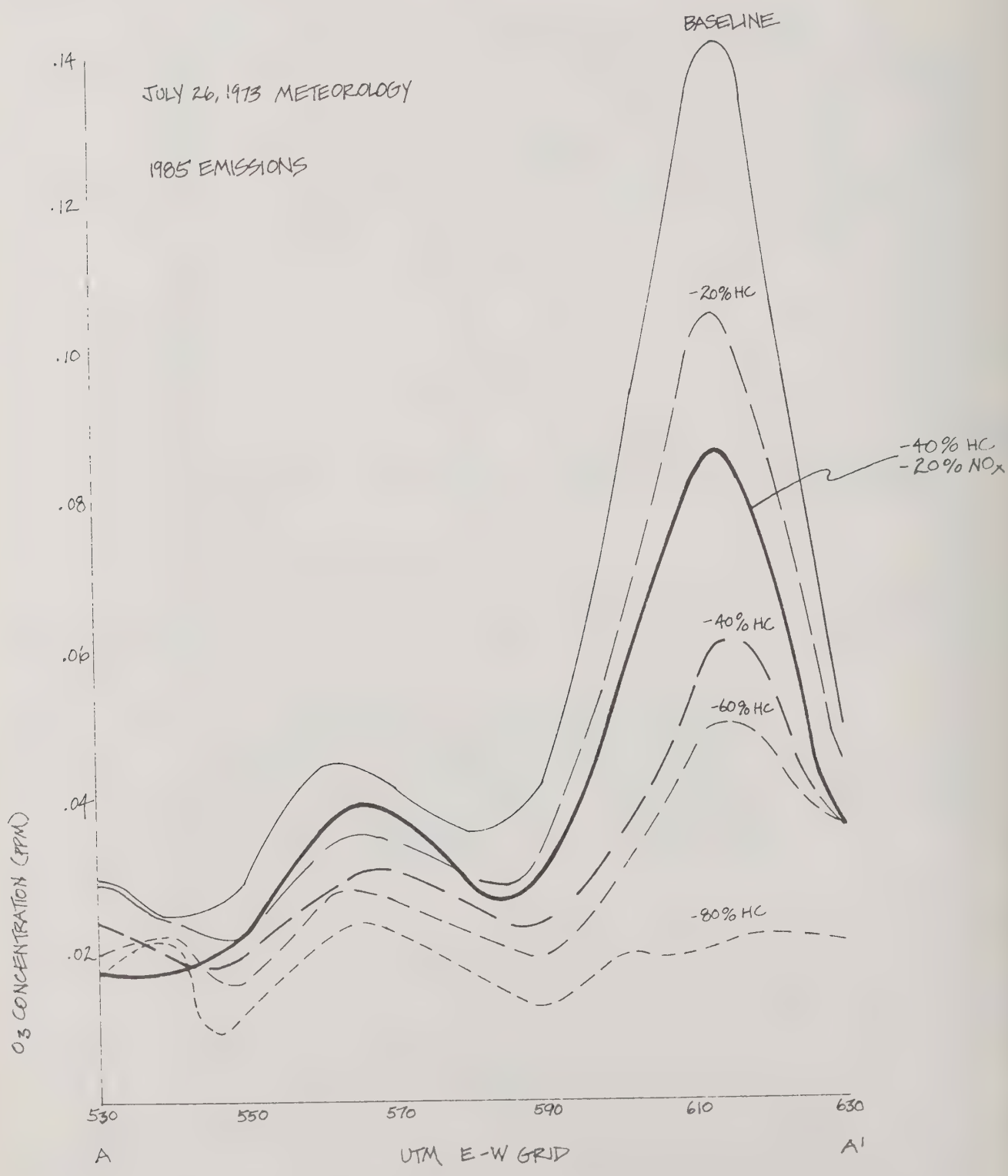


FIGURE C-4 EMISSION SENSITIVITY RESULTS COMPARED BY VARIOUS PERCENT REDUCTIONS ALONG SECTION BB' OF FIGURE C-2

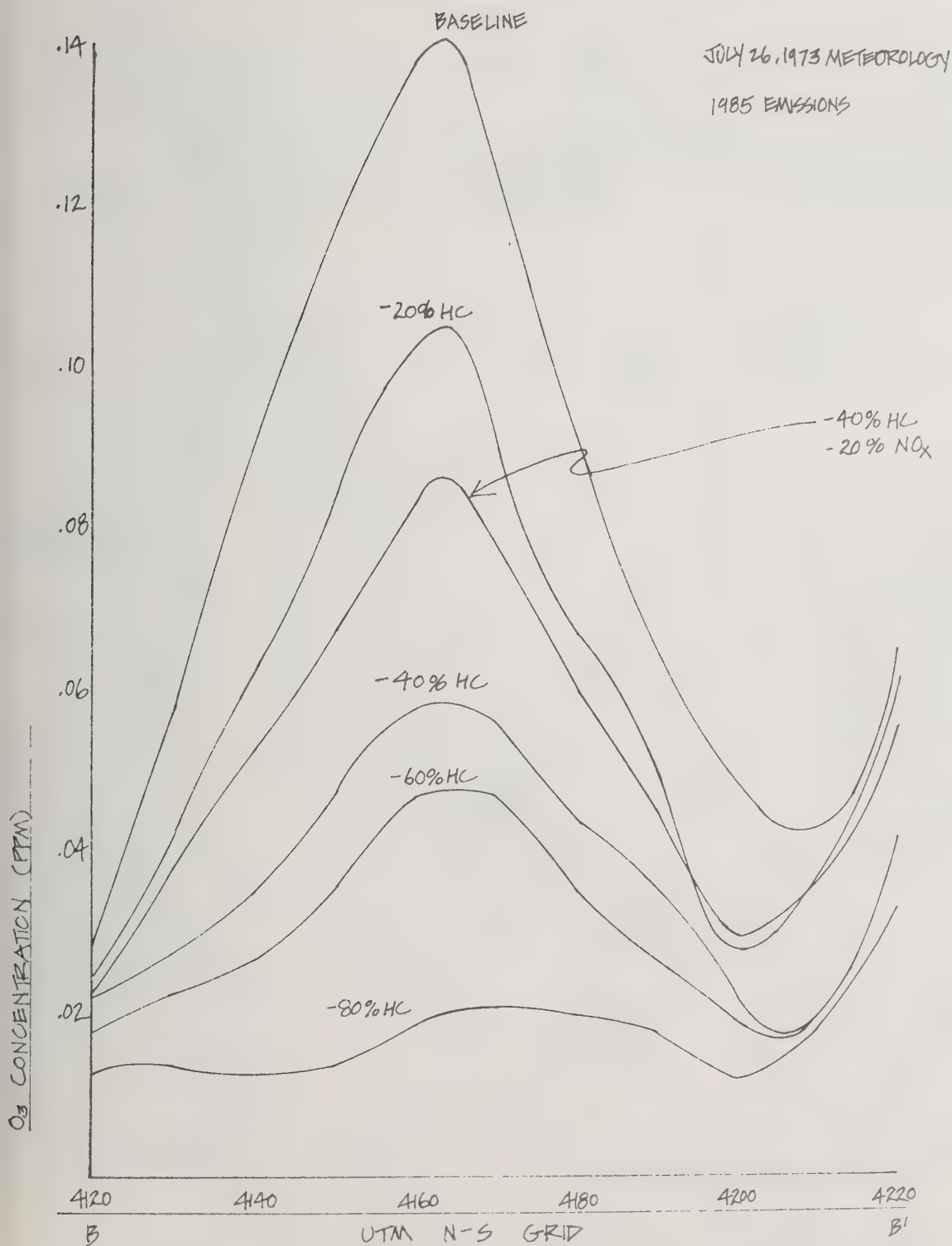


FIGURE C-5- EMISSIONS SENSITIVITY RESULTS ALONG SECTION AA' OF FIGURE C-2 INCLUDING THE EFFECT OF A 40% NO EMISSION REDUCTION WITH NO REDUCTIONS IN HYDROCARBON EMISSIONS.

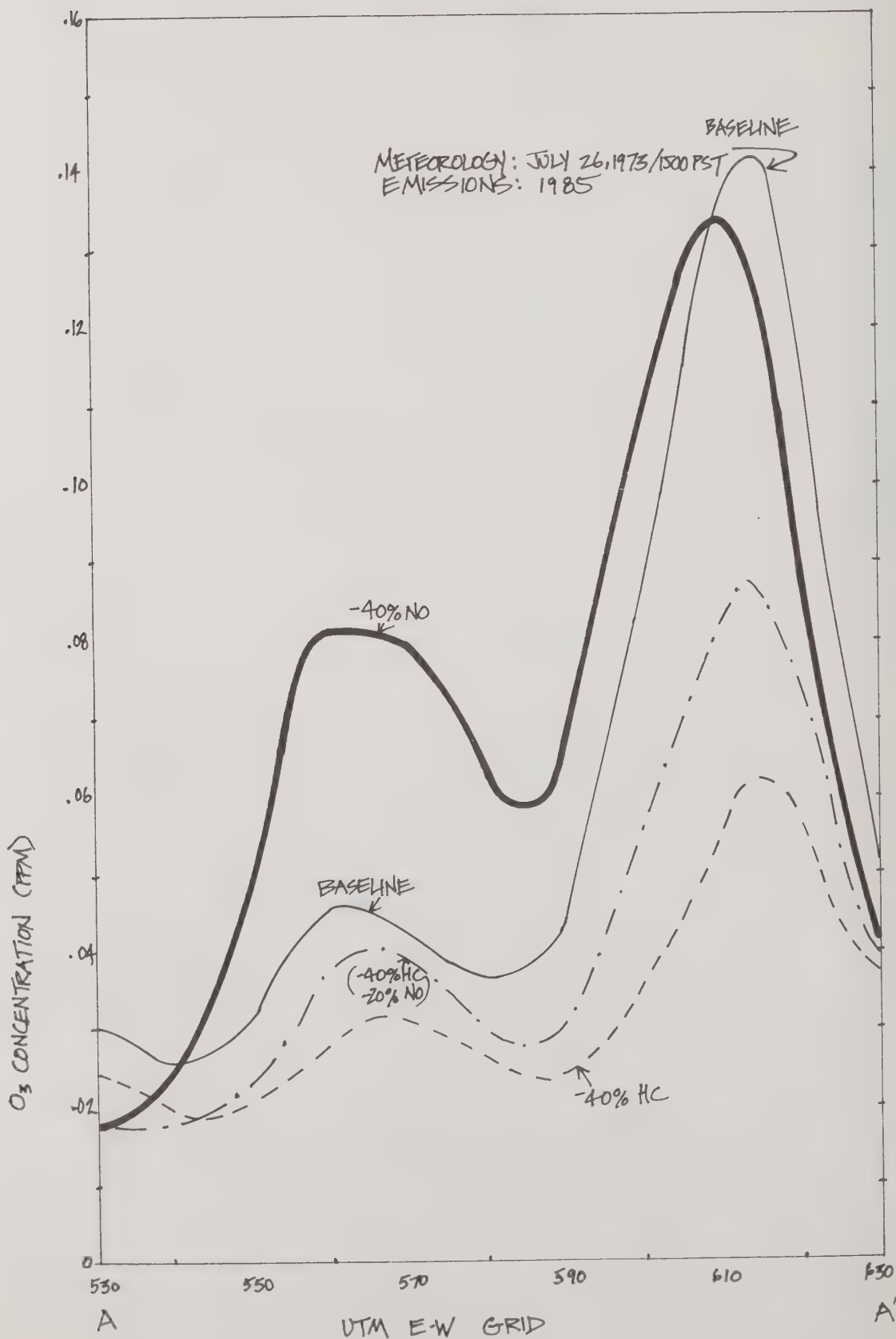
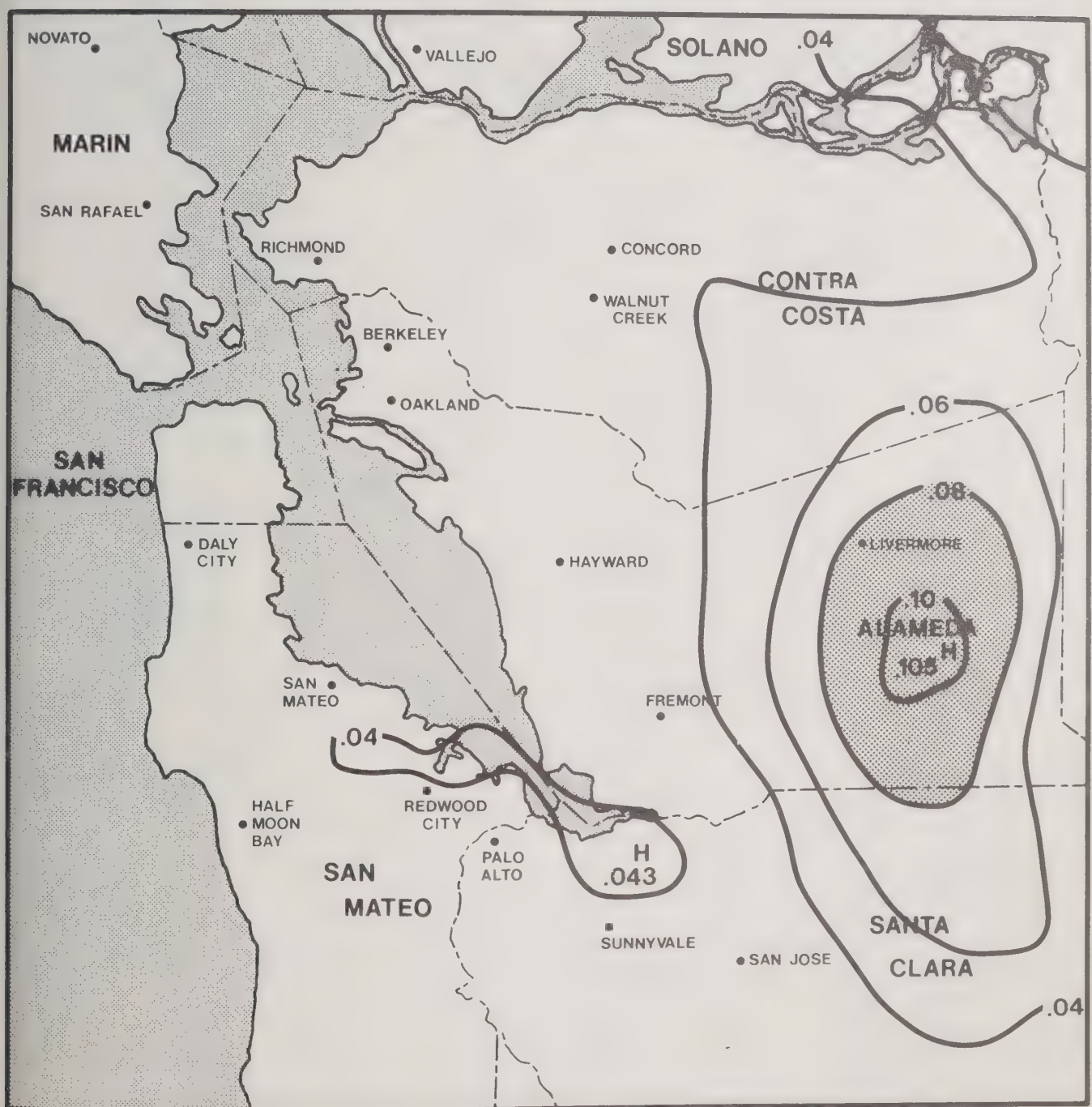
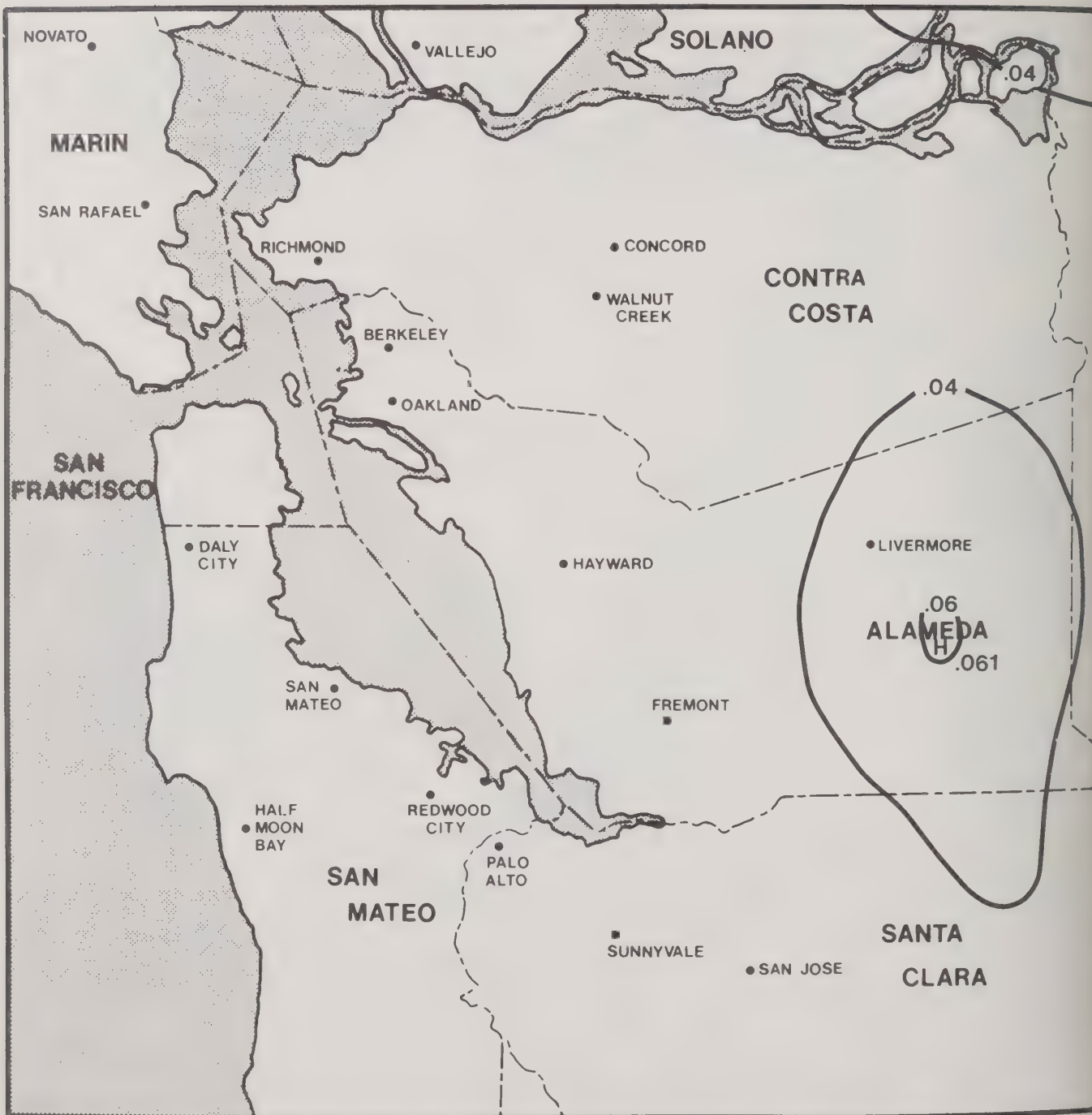


Figure C-6. Example LIRAQ Results - 1985 Ozone Sensitivity Analysis
(20 Percent Hydrocarbon Reduction)



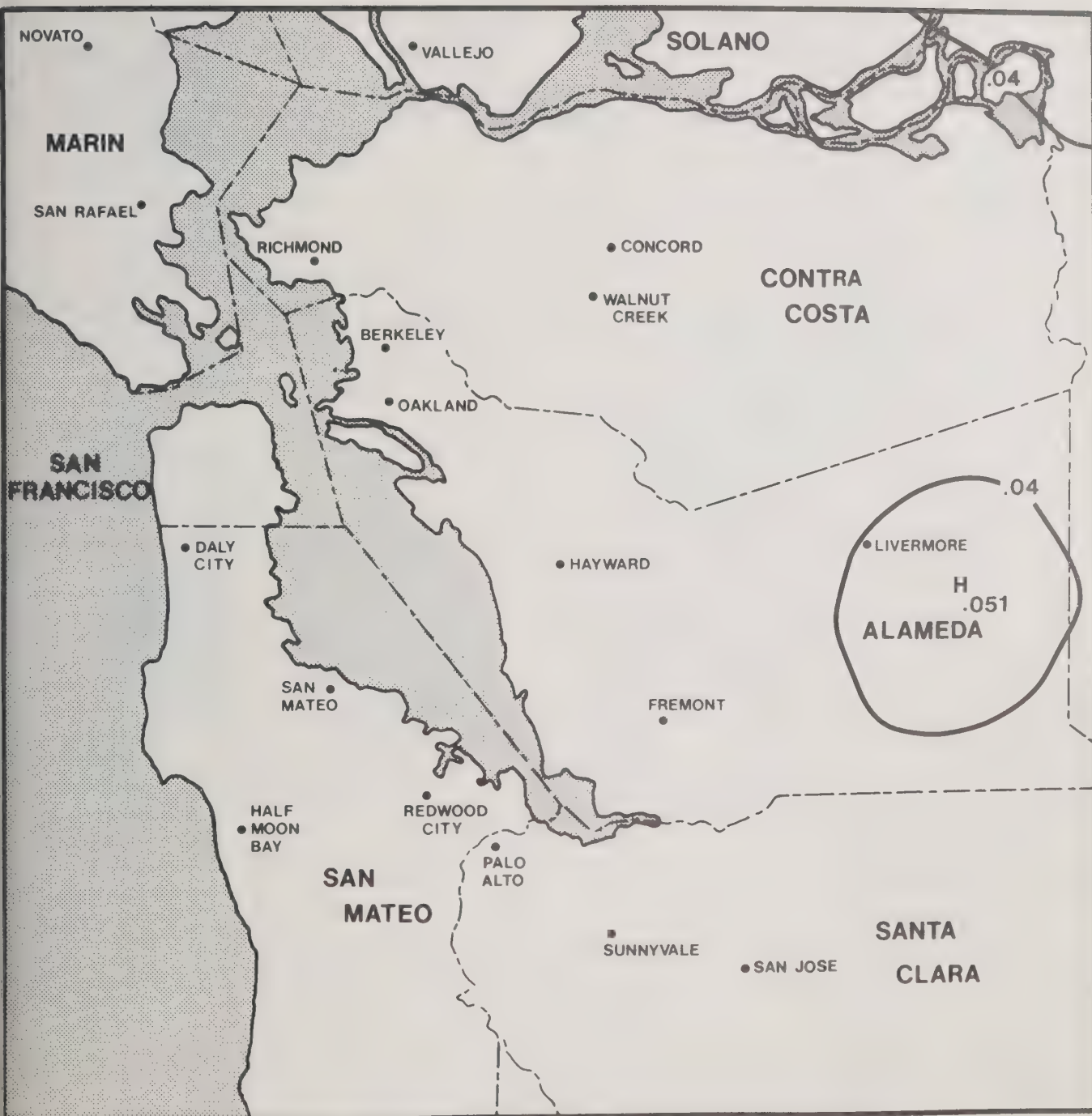
- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 baseline inventory

Figure C-7. Example LIRAQ Results - 1985 Ozone Sensitivity Analysis
(40 Percent Hydrocarbon Reduction)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 baseline inventory

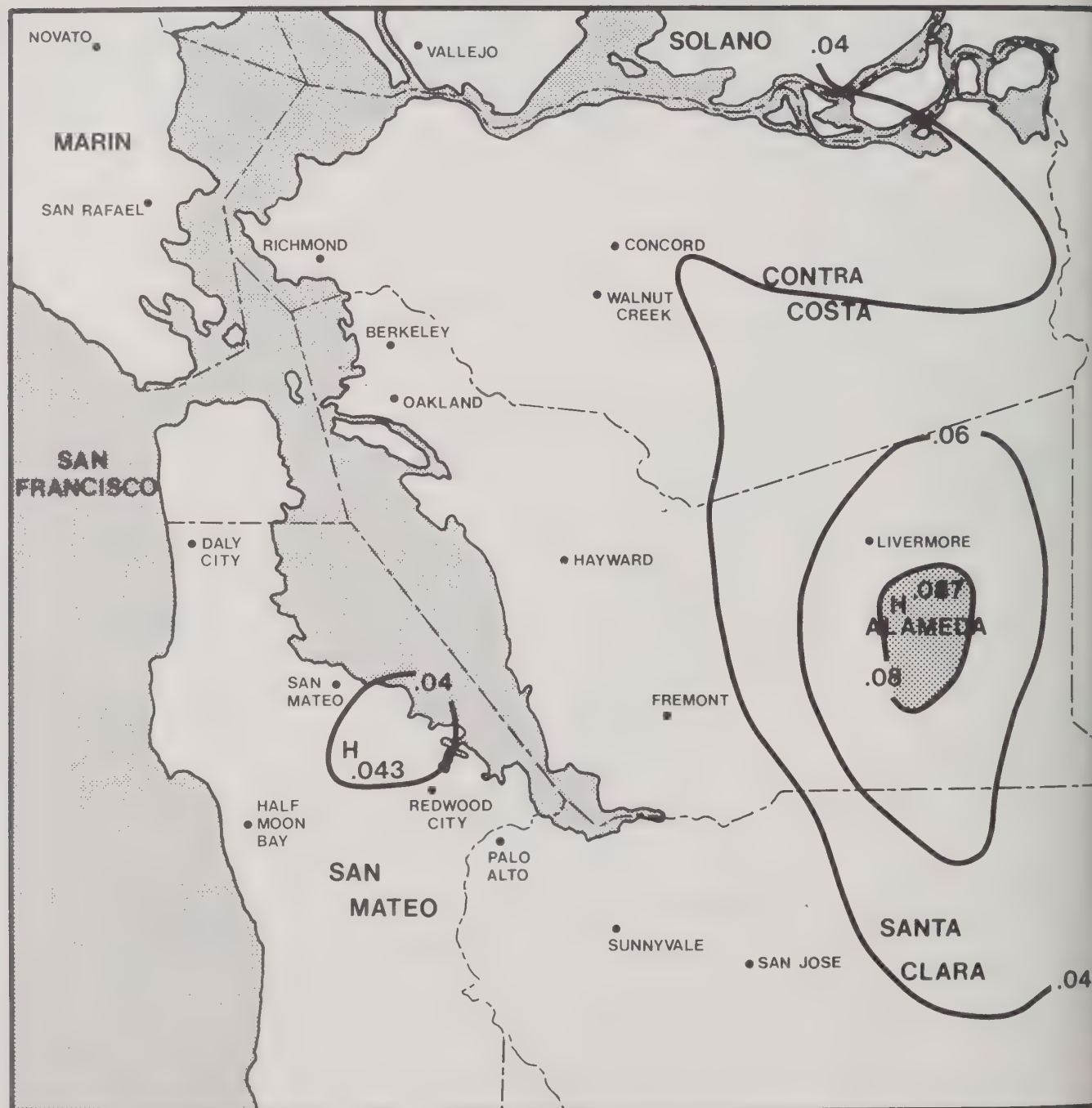
Figure C-8. Example LIRAQ Results - 1985 Ozone Sensitivity Analysis
(60 Percent Hydrocarbon Reduction)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
2) Values uncorrected for worst case conditions
3) Emission reductions taken from 1985 baseline inventory

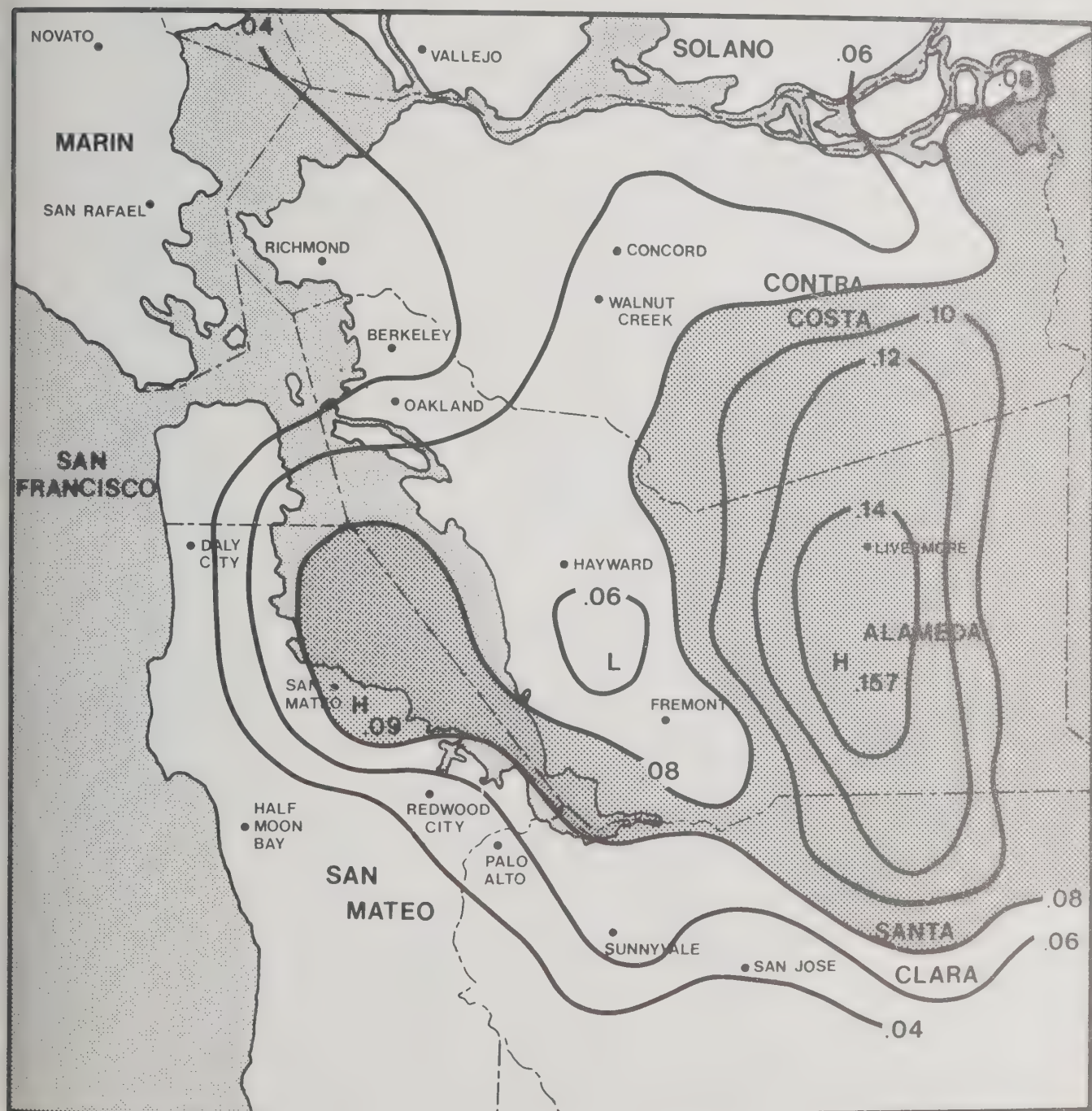
Figure C-9. Example LIRAQ Results - 1985 Ozone Sensitivity Analysis

(40 Percent Hydrocarbon and 20 Percent Nitrogen Oxides Reductions)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
2) Values uncorrected for worst case conditions
3) Emission reductions taken from 1985 baseline inventory

Figure C-10. Example LIRAQ Results - 1985 Ozone Sensitivity Analysis
(40 Percent Nitrogen Oxides Reduction)



- Notes: 1) July 26, 1973 Prototype Meteorology (1500 Hours PST)
 2) Values uncorrected for worst case conditions
 3) Emission reductions taken from 1985 baseline inventory

Chapter VII

**HOW THE
SEPARATE PLANS
WERE MADE
CONSISTENT**

The ABAG Environmental Management Program is the first attempt to produce an integrated plan for solving problems of air, water, and solid waste in a large metropolitan area. This chapter describes how integration occurred and what effects it has had on the plan and on the planning process.

Integrated planning has two major advantages.

1. It produces a plan with different parts (water quality, air quality, solid waste, and water supply) that are consistent with one another.
2. The process of developing and approving the plan allows the following:
 - o Elected officials of cities and counties and the public can examine the overall costs and benefits of all parts of the plan and thereby make a more informed decision about its merits.
 - o Single-purpose regulatory agencies can see how their part of the plan affects and is affected by other parts.

Integration imposed requirements on the planning process and on the plan. These are discussed in the remainder of this chapter.

SCHEDULING

If the different parts of the plan had not been developed and approved on the same schedule, integration would have been difficult. During the preparation of this draft, there was some sentiment for delaying the air quality plan. Such a delay would have had undesirable effects. Changes could not have been made in other plans to make them consistent with the air quality plan. The review and approval of the water and solid waste parts of the plan, an involved six-month process, would have been to a degree a wasted effort. The major issue of compact development and its effect on sewerage and water supply facilities could not have been dealt with in the approval process--if, in fact, it had been raised. There would have been confusion caused by different schedules for different parts of the plan.

CONSISTENCY OF BACKGROUND DATA

If different parts of the plan are to be consistent with one another, they must be based on the same background data. These data include projections of population, land use, and employment as well as data on air pollutant emissions, wastewater flows, and water supply needs. Early in the program, agreements were reached among a number of agencies concerning use of data. A consistent data base was created and has proved to be indispensable to developing the draft plan on schedule and to making adjustments to it.

OVERALL ASSESSMENT OF THE PLAN

One advantage of integrated planning is that it allows decision-makers to see the overall effects of the different parts of the plan and to compare

these effects with other regional goals and policies. This requires that the overall effects be described. Making this overall assessment imposes special requirements on the planning process. One such requirement is the consistent data base referred to previously. Another is a process for using this data base to develop information. In addition, the overall assessment must be described and related to other regional goals and objectives besides environmental ones. This is done in Chapter II.

CONSISTENCY OF THE DIFFERENT PARTS OF THE PLAN

Development of the draft Environmental Management Plan took place in six general steps:

1. Collection of local agencies' policies on development.
2. Projections of the region's future population, land use and employment.
3. Technical analysis of problems and possible solutions (for example, calculation of future wastewater flows and air pollutant emissions, estimates of cost and effectiveness of controls).
4. Incorporation of preliminary comments from advisory committees, the public, and the Environmental Management Task Force.
5. Preparation of four separate management plans.
6. Integration, that is modification of the plans to make them consistent with one another.

These steps are described in more detail on the following figure. This section describes how the four separate management plans from step 5 were changed to make them consistent with one another.

Changes in the Projections

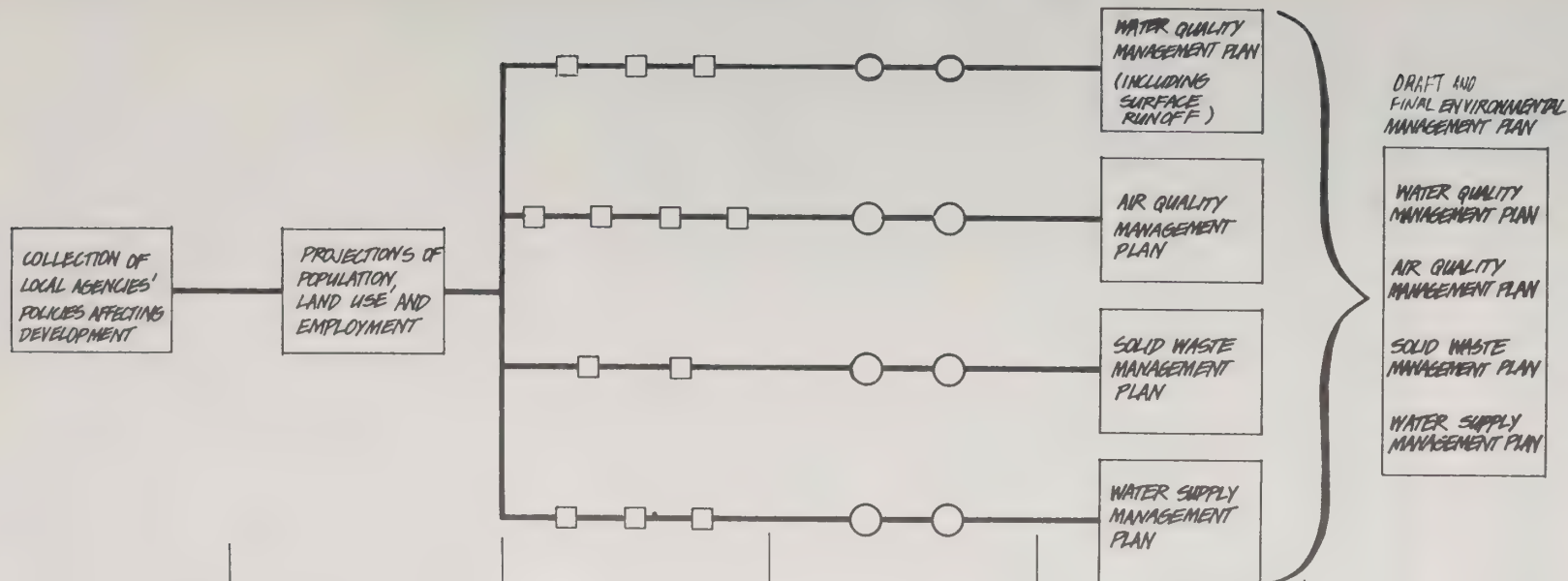
In the draft plan the projections (whose development was summarized in Chapter II) were modified to reflect the recommendation for compact development in the air quality plan. The compact development projections were used as the basis for the recommendations in the draft plan. During the local approval process the recommendations for compact development were deleted. Therefore, the projections were revised and provided (without reflecting the AQMP recommendation for compact development) the basis for this plan.

Changes in the Water Quality Management Plan Recommendations

The major change in this plan was in the project list of municipal sewerage facilities. The project list in the draft separate plan was set forth in the following documents:

- o Progress Report on the Draft Environmental Management Plan, September 1977.
- o Draft Water Quality Management Plan, October 1977.

STEPS IN DEVELOPING THE PLANS



STEP-1

Local agencies, including cities, counties, special districts, and Local Agency Formation Commissions, were surveyed by county planning departments assisted by ABAG. Explicit and implicit policies governing development were collected. (An example of an implicit policy would be one concerning providing service to an area.)

STEP-2

Using the local development policies, projections were made. The totals for the region were based primarily on the birth rate, in-migration, and economic development. Economic development was tempered by national projections of economic development. Population and employment were distributed throughout the region in accordance with local development policies. The projections were reviewed by all local agencies, then revised based on comments. Two projections were made, reflecting the uncertainty about birth rates, in-migration, and economic growth. One projection was for growth from the current 4.9 million people to 6.1 million by the end of the century. The other was for growth to 5.4 million. Both were used in developing the plans.

STEP-3 TECHNICAL ANALYSIS

For each of the plans, technical analyses were made of the problems and possible solutions. For example, in water quality, wastewater flows were projected based on the projections of Step 2. In air quality, estimates of future emissions were made. Then the effectiveness of different solutions was analyzed.

STEP-4 PUBLIC, EMTF & ADVISORY COMMITTEE COMMENT

Comments from the public, from EMTF, and especially from advisory committees, were incorporated into the plans.

STEP 5 DRAFT SEPARATE PLANS

The four separate plans were described in draft form. The plans were based on the same projections (Step 2) but were not adjusted to be consistent with one another. These plans were summarized in the Progress Report of September, 1977.

STEP-6 PLAN INTEGRATION

The recommendations in each plan were adjusted to make them consistent with each other's plan, thereby producing the Draft Environmental Management Plan. For example, the Water Quality Plan contains a list of all publicly owned sewerage facilities needed by the end of the century. The air quality plan as drafted recommended compact development. Compact development would have changed local development policies (Step 1). Changing those policies changes the projections in Step 2, the analysis in Step 3 and the list of facilities in the water quality plan in Step 5. When compact development was deleted from the air quality plan, the list in had to be changed again.

This list was based on an inventory of the needs of wastewater agencies. The treatment works in the inventory were modified to make them consistent with the projections of population, land use, and employment. Interceptors, collection systems, and reuse projects had not been analyzed for consistency with projections at the time that list was prepared.

The recommendation for compact development in the air quality plan would have changed those projections, thereby changing the timing of projects on the list. However, when the compact development recommendations were removed from the plan, the list was revised again. It is based on the high population projection.

Detailed planning for several interceptors and collection systems shown on the project list is scheduled for the next year, before the first annual update of the plan. These projects are consistent with the projections. Interceptors and collection systems scheduled later have not been analyzed for consistency. That analysis will be part of the continuing planning process.

The effect of the water conservation recommendation on the project list was considered. It was found that the recommended amount of conservation would not change the timing or capacity of sewerage facilities. The reasons are as follows: Some parts of sewage treatment plants are designed primarily on the basis of the amount of organic material in sewage. Water conservation does not change this amount. Therefore, those parts of the treatment plants would not be significantly affected. The other parts of treatment plants and all other sewerage facilities (sewers, interceptors, outfalls, diffusers) are designed on the basis of the rate of flow of sewage. However, the rate that is most important is a peak rate (not necessarily the absolute instantaneous peak). This usually occurs in wet weather because of the unintended flow of storm runoff or groundwater into sewers. Water conservation would have no effect on this unintended flow. Older sewer systems are particularly susceptible to inflow. Reduction of this inflow is always considered as an alternative to treatment plant expansion. In some cases reduction can be justified economically. Even in new systems though, peaks of 2 to 2½ times dry weather flows are common. The effect of water conservation, at the proposed level, on these peaks is not significant. Therefore, the recommendation for water conservation does not affect the project list.

The water quality management plan also contains a recommendation for construction of industrial wastewater treatment facilities. The plan does not set forth the specific treatment works to be built by each industry. The treatment processes would be by specified Federal regulations for industries that discharge directly to the bay; for industries that discharge to municipal sewers, specific treatment requirements would be set in the continuing planning process. The capacity and type of treatment works for each industry could be affected by three other recommendations. The recommendation for water conservation could change the amount of wastewater generated by an industry. The recommendation for water reuse could do the same. The air quality recommendation for available control technology could change the amount or type of wastewater an industry produces (air quality controls often convert air pollutants to water pollutants). All of these three recommendations could affect the capacity and type of wastewater treatment works that each industry builds. However, because the recommendations for industrial wastewater treatment are not that specific in the water quality management plan, the recommendations are not affected. As the recommendations become more specific in the continuing planning process, they will be evaluated and modified to be consistent with other parts of the plan.

Changes in the Air Quality Management Plan Recommendations

The way in which several recommendations are carried out could be affected. For example, requirements for treatment of industrial wastewaters could influence an industry's decisions on how to comply with the air quality recommendation for use of available control technology. The wastewater requirements could also influence an industry's decision on where to locate, thereby affecting how the New Source Review program in the air quality plan would be carried out.

Changes in the Solid Waste Management Plan Recommendations

No changes in the recommendations in this plan were made as a result of recommendations in other plans. The amount of solid waste generated will be affected by requirements for reducing air and water pollution. However, the specific effects can only be determined on a discharger-by-discharger basis. This has been done for municipal dischargers, and these recommendations (developed by the Wastewater Solids Study) reflect the wastewater discharge requirements. The effect on industrial solid waste production would be considered in the continuing planning process.

Changes in the Water Supply Management Plan Recommendations

No changes were made in this plan as a result of recommendations in other plans.

PLAN APPROVAL PROCESS

To achieve the advantages of integrated planning means that the approval process must provide for action by those regulatory agencies responsible for the environmental issues addressed by the plan. That is why a number of months were set aside for the approval process. It involves the separate action of many agencies prior to submittal to EPA. Consequently, this process is achieving the second advantage listed at the beginning of this chapter, namely,

The process of developing and approving the plan has allowed:

- o elected officials of cities and counties and the public to examine the total costs and benefits of all the parts of the plan and thereby make a more informed decision about its merits relative to other regional goals
- o single-purpose regulatory agencies to see how their part of the plan affects and is affected by other parts

INTEGRATED CONTINUING PLANNING PROCESS

The advantages of the integrated approach would be lost if integrated planning did not occur in the future. Therefore the initial Environmental Management Plan calls for a continuing planning process that has the basic characteristics of the process used to develop this plan. In other words,

as the plan is updated, all parts of it would be consistent with one another. During each annual update of the plan, for example, impacts of water quality solutions on solid waste and air quality programs would be examined and the recommendations made consistent. The mutually supportive gains made in this initial plan to solve environmental problems would continue to be made.

Chapter VIII
WHAT HAPPENS
AFTER THE PLAN
IS APPROVED

This chapter of the Environmental Management Plan focuses on two independent but related concerns:

- Governmental organization for implementing the initial plan.
- The continuing planning process.

The two subjects will be taken up in order. There is a separate set of policies and actions for each. Plan Implementation recommendations and Continuing Planning Process recommendations are collected and displayed on Tables 1 and 2 of this chapter.

IMPLEMENTING THE INITIAL ENVIRONMENTAL MANAGEMENT PLAN

Decisions on how to manage the Bay Area's environmental resources have for many years been made mostly by single-purpose agencies at Federal, State, regional and local levels. This system worked well when it appeared that there was a straightforward solution to a clearly defined problem. Environmental issues demand a comprehensive approach to decision-making, especially to examine social and economic effects. The public must have a greater voice in these increasingly difficult decisions. Water, air and solid waste decisions are becoming more and more interrelated. The combined fiscal impact on cities and counties and the average citizen of such decisions is mounting. The way our region grows also has a direct effect on the environment.

The Current System of Environmental Management

The Bay Area has an exceedingly complicated governmental structure. Listed below are the types of agencies with environmental management responsibilities in the Bay Area. These include planning, service delivery, regulatory and other agencies. Agencies are listed alphabetically. Although one regulatory agency, such as the Regional Water Quality Control Board or the Air Pollution Control District, might play the major role in one type of pollution control, its authority is by no means all inclusive. Numbers after the name of the agency refer to a key at the bottom of the list where specific responsibilities are indicated. The number of responsibilities, of course, bears little or no resemblance to ultimate influence in environmental management.

A. Water Quality Agencies

1. Association of Bay Area Governments - 1, 2, 3, 4
2. California Pollution Control Financing Authority - 2

3. California State Department of Fish and Game - 4
4. California State Department of Health - 4
5. California State Lands Commission - 4
6. California State Office of Emergency Services - 4
7. California State Water Resources Control Board -
1, 2, 3, 4
8. City and County animal control units - 3
9. City and county building departments - 3, 4
10. City and county planning and zoning departments - 3
11. City and county police and sheriff units - 3
12. City and county public works departments, including
flood control agencies and water districts - 3
13. County agricultural commissioners - 3
14. County departments of health - 3, 4
15. County mosquito abatement districts - 3
16. County 208 lead agencies - 3
17. Local resource conservation districts - 3
18. Local sewerage agencies (e.g., San Jose as a city,
East Bay Municipal Utility District as a special
district, East Bay Dischargers Authority as a Joint
Powers Agency) - 1, 2
19. San Francisco Bay Conservation and Development
Commission - 4
20. San Francisco Bay Regional Water Quality Control Board -
1, 2, 3, 4
21. U.S. Army Corps of Engineers - 4
22. U.S. Coast Guard - 4
23. U.S. Department of Transportation - 4
24. U.S. Environmental Protection Agency - 1, 2, 3, 4
25. U.S. Fish and Wildlife Service - 4

26. U.S. Small Business Administration - 2

27. U.S. Soil Conservation Service - 3

Key to Water Quality Agencies

1 - Responsibilities for municipal wastewater facilities

2 - Responsibilities for industrial discharges

3 - Responsibilities for surface runoff

4 - Responsibilities for miscellaneous sources of water pollution (on-site disposal systems, vessel wastes, dredging, mining, and oil and chemical spills)

B. Air Quality Agencies

1. Association of Bay Area Governments - 1, 2, 3, 4

2. Bay Area Air Pollution Control District - 1

3. California Air Resources Board - 1, 2, 3

4. California Pollution Control Financing Authority - 1

5. California State Department of Transportation - 3

6. California Toll Bridge Authority - 2

7. City and county public works departments and road maintenance districts - 3

8. Local Agency Formation Commissions - 4

9. Local and regional transit districts - 3

10. Local government cities, counties and special districts - 4

11. Metropolitan Transportation Commission - 3

12. Public and publicly regulated utilities - 4

13. San Francisco Bay Conservation and Development Commission - 4

14. U.S. Environmental Protection Agency - 1, 2, 3

15. U.S. Federal Highway Administration - 3

16. U.S. Small Business Administration - 3

Key to Air Quality Agencies

- 1 - Responsibilities for stationary sources
- 2 - Responsibilities for vehicle emissions
- 3 - Responsibilities for transportation
- 4 - Responsibilities for land use sources of air quality impact

C. Solid Waste Agencies

- 1. Association of Bay Area Governments - 1, 2, 3
- 2. Bay Area Air Pollution Control District - 1, 2, 3
- 3. California Air Resources Board - 1, 2, 3
- 4. California State Department of Health - 2
- 5. California State Solid Waste Management Board - 1, 2, 3
- 6. California State Water Resources Control Board - 1, 2, 3
- 7. County departments of health - 1, 2
- 8. County litter control units - 1
- 9. County offices of emergency services - 2
- 10. County solid waste management agencies - 1, 2
- 11. Local government cities, counties, and special districts - 1, 2
- 12. Local wastewater agencies - 3
- 13. San Francisco Bay Regional Water Quality Control Board - 1, 2, 3
- 14. San Francisco Bay Region Wastewater Solids Study - 3
- 15. U.S. Environmental Protection Agency - 1, 2, 3
- 16. U.S. Interstate Commerce Commission - 1

Key to Solid Waste Agencies

- 1 - Responsibilities for municipal wastes
- 2 - Responsibilities for hazardous wastes
- 3 - Responsibilities for wastewater residuals

D. Water Supply Agencies

1. Association of Bay Area Governments
2. California State Department of Health
3. California State Department of Water Resources
4. California State Public Utilities Commission
5. California State Water Resources Control Board
6. County departments of health
7. Local water distributors
8. Local water wholesalers
9. U.S. Army Corps of Engineers
10. U.S. Bureau of Reclamation
11. U.S. Environmental Protection Agency

By law, the Environmental Management Plan must designate management agencies to carry out the plan recommendations. As noted in the preceding list, the existing governmental system is complex, with many agencies. Therefore, the Environmental Management Task Force had to have an orderly way of examining the Bay Area's existing governmental structure for its ability to carry out the plan recommendations. The EMTF Plan Implementation Committee adopted a set of "guiding principles" and grouped them into three categories:

- Governmental organization and agency decision-making
- Financing implementation of the initial plan
- Institutional and financial aspects of the continuing planning process

Governmental Organization and Agency Decision-Making

1. Management agencies designated in the Environmental Management Plan (EMP) must have sufficient authority to implement the initial plan, including addressing all applicable Federal and State standards.
2. Management agencies designated in the EMP should be capable of dealing with both direct and indirect sources of environmental pollution.

3. Where environmental problems are being solved by existing governmental arrangements taking into account their social, economic or environmental consequences, recommendations should not be made to change this structure needlessly. Where environmental problems cannot be solved through existing governmental arrangements, recommendations should be made to change this structure.
4. Management agencies should be able to respond to changing conditions and emerging environmental problems.
5. Air quality, water quality, and solid waste management decisions made by management agencies should not be in conflict with one another. A mechanism should be developed to resolve such conflicts when they arise.
6. The decision-making procedures used by environmental management agencies should be as consistent as possible, and changes in procedure should not be made unless there is a clearly defined need.
7. Implementation of the plan should be vested in many agencies at all levels of government. Because pollution does not respect jurisdictional boundaries, and because the EMP is a regional plan, overall responsibility for coordinating and integrating its implementation should be at the regional level.
8. Assessment of environmental management decisions should be a continuing process. Environmental decisions should take into account non-environmental factors.
9. Decisions affecting the environment should be coordinated among agencies and jurisdictions. Intergovernmental coordination is essential.
10. The decision-making process should be clear to all participants.
11. The decision-making process should be shorter and less expensive than it currently is.
12. The decision-making process should allow for extensive citizen participation.
13. Those affected by management agency actions should have the right to adequate notice, appeal, and other legal safeguards.
14. As required by Public Law 92-500, Section 208, water quality management agencies must collectively possess the specific powers:

- A. "To carry out appropriate portions of an areawide waste treatment management plan developed under (Section 208);
- B. To manage effectively waste treatment works and related facilities serving such area in conformance with any plan required by (Section 208);
- C. Directly or by contract, to design and construct new works, and to operate and maintain new and existing works as required by any plan developed pursuant to (Section 208);
- D. To accept and utilize grants, or other funds from any source, for waste treatment management purposes;
- E. To raise revenues, including the assessment of waste treatment charges;
- F. To incur short- and long-term indebtedness;
- G. To assure in implementation of an areawide waste treatment management plan that each participating community pays its proportionate share of treatment costs;
- H. To refuse to receive any wastes from any municipality or subdivision thereof, which does not comply with any provisions of an approved plan under this section applicable to such area; and
- I. To accept for treatment of industrial wastes."

Financing Implementation of the Plan

- 1. Financing the implementation of the EMP will make maximum use of Federal and State grants.
- 2. Financing alternatives will generally depend on local money.
- 3. For contingency purposes, financing alternatives that do not rely on Federal and State grants will be developed.
- 4. Where existing financial arrangements assist in solving environmental problems without unacceptable social, economic or environmental consequences, the EMP should not recommend changing these arrangements needlessly.

Institutional and Financial Aspects of the Continuing Planning Process

- 1. The continuing planning process should be undertaken by the coordinating agency that developed the EMP. The process

must include mechanisms to ensure continuing participation by agencies implementing the plan. An areawide policy committee should oversee this process.

2. The continuing planning process should be formally linked to and integrated with other environmental planning efforts in the region. Cooperative agreements with other environmental planning agencies should be sought.
3. Citizens should be full participants in the continuing planning process.
4. A system to finance the continuing planning process must be established.
5. EPA's "Guidelines for State and Areawide Water Quality Management Program Development" (November, 1976) provide that:

"Management agency designations cannot be fully approved by EPA unless the agencies have adequate statutory authority and the regulatory programs required to implement the plan."

Adequate legal authority to implement the plan fully may not exist at the time of plan approval by State and Federal agencies. Therefore, legislative recommendations will be a part of the initial EMP. As appropriate enabling legislation becomes available, such elements will automatically become an approved part of the plan.

EMTF Guidance and Carrying Out the Initial Plan

The EMTF Plan Implementation Committee, in examining the institutional and financial issues associated with implementing and updating the plan, recommended the following:

"The Plan Implementation Committee believes that there needs to be improved coordination in the implementation of the EMP. However, because this may not be possible for the time being, we are recommending that existing governmental and financing arrangements implement the initial EMP for up to two years. We believe that EMTF should remain in existence for this interim period to perform at least the following three functions:

1. To continue responsibility for updating the EMP;
2. To monitor, coordinate and oversee the implementation of the EMP;
3. To develop and recommend governmental and financing mechanisms for planning and implementation beyond the interim period."

This position was adopted by the Environmental Management Task Force and is reflected in the policies and actions of this chapter.

Plan Implementation Policy 1: The initial Environmental Management Plan should be implemented as much as possible by existing governmental agencies using current authority. (The Actions to implement this policy have been incorporated into the individual management plans.)

As noted previously in the plan recommendation tables, however, adequate legal authority does not exist to carry out a few of the recommendations contained in the Environmental Management Plan. In addition, certain implementing actions included in the plan chapters involve legislative advocacy, because if local governments in the San Francisco Bay Region are to be expected to carry out actions to achieve effective environmental management in the region, they will need the involvement of Federal and State legislators in changing laws that will make it easier for environmental management to be achieved in the Bay Area.

Plan Implementation Policy 2: Federal and State governments should make legislative and administrative changes to carry out Environmental Management Plan recommendations, as necessary.

Action 2.1 Provide additional funding for the California Department of Health to establish and carry out regulations for commercial and recreational shellfish harvesting in San Francisco Bay. This recommendation supports Policy 3 and its actions in the Water Quality Management Plan.

Action 2.2 Enact legislation to require existing marinas and harbors to provide on-shore toilet facilities. This recommendation supports Policy 10 and its actions in the Water Quality Management Plan.

Action 2.3 Unless preempted by Federal law, enact legislation on liability requirements and compensation to minimize water pollution from oil spills. This recommendation supports Policy 12 and its actions in the Water Quality Management Plan.

Action 2.4 If determined to be necessary by the time of the first annual revision of the Environmental Management Plan, enact legislation requiring cities and counties to revise and update building codes to include water conservation in new construction. This recommendation supports Policy 2 and its actions in the Water Supply Management Plan.

Action 2.5 Enact legislation providing incentives for water conservation in existing buildings and for agricultural water conservation. This recommendation supports Policy 2 and its actions in the Water Supply Management Plan.

Action 2.6 Enact legislation to promote waste reduction where appropriate, and to support stable, adequate markets for secondary materials and products made from them. This recommendation supports Policies 6 and 9 and their actions in the Solid Waste Management Plan.

Action 2.7 Provide increased financial support for job retraining programs for workers displaced by new air quality stationary source control. This recommendation supports Policy 1 in the Air Quality Plan.

Action 2.8 Enact legislation to implement a Statewide inspection/maintenance program for light and heavy duty vehicles. This recommendation supports Policy 2 in the Air Quality Plan.

Action 2.9 Enact legislation to require exhaust control devices on existing heavy duty gasoline vehicles Statewide. This recommendation supports Policy 2 in the Air Quality Plan.

Action 2.10 Provide additional financial support for local transit operators to substantially increase regional transit service as a means of achieving Federal and State air quality standards. This recommendation supports Policy 3 in the Air Quality Maintenance Plan.

Action 2.11 The ABAG Environmental Management Plan has met stringent standards for air quality. It is possible there may be significant economic and social adjustments. Therefore we request Congress to re-examine the no-risk philosophy and requirements of the Clean Air Act to make them reasonable for local governments to comply.

The Environmental Management Plan, as required by law, designates agencies to carry out plan recommendations. Much of the organizational analysis conducted during plan preparation concentrated on how to carry out the individual plan control measures. As indicated above in Plan Implementation Policies 1 and 2, the plan relies heavily on the existing governmental structure and the agencies listed previously in this chapter. Agencies assigned responsibilities to carry out the control measures are listed in the summary tables for each of the management plans. Management agency responsibilities are also noted in Volume II of the plan.

Although the plan recommends using the existing governmental structure for a period of up to two years, certain short-term improvements (other than those which would require legislative change, as noted above) can be instituted without conflicting with the basic principle that the existing structure should be used to carry out the plan.

These short-term improvements are described in the individual management plans and elsewhere in this chapter, but they can be recapitulated as follows. Recommendations are made in the initial Environmental Management Plan to implement the following short-term improvements for environmental management:

- o An agreement establishing San Francisco Bay-Delta Research Advisory Council to investigate need for coordinating water quality research and data collection.
- o An agreement among major water and possibly wastewater agencies to form a voluntary water management coordinating committee to address regional water supply issues.
- o A continuation of existing agreements among agencies presently participating as the Air Quality Maintenance Plan Joint Technical Staff.

- A Memorandum of Understanding between ABAG and the San Francisco Bay Regional Water Quality Control Board to integrate water quality planning by the two agencies.
- A Memorandum of Understanding between ABAG and the State Water Resources Control Board to integrate ABAG's grant review function under Circular A-95 with the State Board's decision-making responsibility for 201 wastewater facilities projects.
- Specific administrative procedures for improving the permit system for energy recovery facilities.

Management Agreements

The Environmental Protection Agency has recently published new requirements relating to plan adoption and approval by the Federal government. According to these new regulations, which were published in September of 1977, ABAG will be required to secure management agreements with agencies responsible for carrying out the appropriate actions in the plan. This is intended to give assurance to EPA that the plan will be implemented. The details of what these agreements contain and how ABAG seeks them are being resolved. A full report will be made for the first annual plan update.

Plan Implementation Policy 3 Plan implementation should be ensured through the timely and appropriate completion of management agreements as required by Federal regulations.

Action 3.1 Obtain management agreements to implement the policies and actions of appropriate portions of the Environmental Management Plan.

THE CONTINUING PLANNING PROCESS

The Environmental Management Task Force was created to prepare a regional Environmental Management Plan. The broadly representative task force, with the advice of the public and numerous technical committees, spent more than two years at this task. EPA must act on the initial plan in 1978. Federal law, however, requires both a continuing planning process and an annual update of the initial plan. Both are clearly needed. Complex environmental issues cannot be solved in a two-year period. Further analysis will be required. As experience is gained in implementing the plan, it will probably prove necessary to modify aspects in the annual revisions to the plan. Updating the plan will involve a continuing environmental, social and economic assessment of the recommended actions in the updated plan, the revision of governmental and financial measures for implementing the updated plan, and the development of measures to mitigate the adverse effects of the control measures designed to meet the region's environmental goals.

Developing the Initial Environmental Management Plan

The development of the initial plan has been a complex undertaking. The key features of this arrangement have been:

- A 46-member advisory body, the Environmental Management Task Force
- Several committees of the EMTF
- Advisory committees assisting staff in important planning matters
- Staff representatives from the region's counties, involved most importantly in the development of the surface runoff management plan
- Staff representatives from agencies participating in preparation of the air quality maintenance plan
- A Program Review Board to communicate relevant Federal and State environmental management policies to ABAG
- Liaison staff (from the Environmental Protection Agency, State Water Resources Control Board, California Air Resources Board and Regional Water Quality Control Board) with whom planning staff have been working on almost a daily basis
- A program to ensure that the public and affected interest groups are able to affect plan development at all its key points
- A set of formal procedures to guide the operations and interactions of all these components in the planning process. This includes a formal plan approval process and a method for updating the plan on a yearly basis

The Management System for the Continuing Planning Process

Continuing Planning Process Policy 1 The process for continued environmental management planning and plan update should be based on that established for the initial Environmental Management Plan.

1. The Role of ABAG. ABAG has had the overall responsibility for preparing the initial Environmental Management Plan. As a result, local governments have been able to express their concerns on issues relating to environmental management as well as regional growth and development. Throughout the period of time since designation of ABAG as a "208" agency, the role of the agency has been one of planning and coordination. ABAG has not been a regulatory or enforcement agency. Nor does it seek to become one.

The development of the initial plan has shown that a single agency should assume ultimate responsibility for the continuing planning process, including plan update and approval. ABAG should continue to perform the roles of planning and coordination during the continuing planning process.

Action 1.1 Designate ABAG as the lead agency for the Federally required continuing planning process.

2. Future Policy Guidance. The Environmental Management Task Force has been the policy advisory body overseeing and directing development of the initial EMP. Under this action, the ABAG Executive Board would establish the required policy body to manage the continuing planning process. Size and composition would be determined by the Executive Board. Regardless of makeup, this committee should be recognized as a focal point of integrated environmental planning in the Bay Area. State legislation to formalize this recognition might be considered.

The most important function of the policy advisory body would be to prepare an annual report that: (1) evaluates compliance with the previous year's plan, and (2) updates the plan.

Action 1.2 Establish the required policy advisory body to manage the continuing planning process.

3. The Planning Staff. Many agencies have assisted in preparing the initial EMP. The technical ability acquired during the initial planning period should be retained and applied to the specific activities of the continuing planning process. This staff should be reduced in size and made consistent with the work to be done. The air quality maintenance plan portion of the EMP is being developed by a joint staff involving ABAG, the California Air Resources Board, the Bay Area Air Pollution Control District, the Metropolitan Transportation Commission, and the California Department of Transportation. This staff arrangement should be maintained, since solutions to the region's air quality problems will require the cooperation of all these agencies. A similar staff arrangement for water quality planning in the continuing planning process should be established. Finally, ABAG staff should work together with the State Water Resources Control Board to ensure the integration of ABAG's grant review function under Circular A-95 with the State Board's decision-making responsibilities for 201 wastewater facilities projects.

Action 1.3 Continue joint staff arrangements for air quality planning.

Action 1.4 Execute a Memorandum of Understanding to integrate Bay Area water quality planning, including the establishment of a joint water quality planning staff similar to that for air quality planning.

Action 1.5 Execute a Memorandum of Understanding between ABAG and the State Water Resources Control Board. This memorandum would integrate ABAG's grant review function under Circular A-95 with the SWRCB's decision-making responsibilities for 201 wastewater facilities projects.

4. The Advisory Committees. Several advisory committees have been established to provide information and assistance to ABAG on the initial plan. These committees should continue to function because their subject areas will be important components of continued planning. The Surface Runoff and Miscellaneous Sources Coordinating Committee would be consolidated with the Municipal/Industrial Wastewater Advisory Committee to become a Water Quality Advisory Committee, giving technical assistance for updating the water quality portion of the initial plan. The Air Quality Advisory Committee would assist in refining the air quality plan. Likewise, the Solid Waste Advisory Committee would help update

the regional solid waste plan. The Water Conservation, Reuse and Supply Advisory Committee would have similar responsibilities for the water supply section of the EMP. The existing Special Studies Advisory Committee would be merged with the new Water Quality Advisory Committee. These committees would meet as needed.

The Lead Agency Coordinating Committee is composed of staff from each county. Its major responsibility has been to work with ABAG in developing a regionally integrated and consistent plan for surface runoff management, one of the elements of the EMP. Continuation of this committee would make the update and refinement of the surface runoff plan, as well as monitoring implementation of the initial plan, more efficient.

In addition, three other advisory committees should be maintained: the Projections Technical Advisory Committee, the Assessment Advisory Committee, and the City Managers' and County Administrators' Committee.

Action 1.6 Maintain appropriate advisory and lead agency committees. They would meet as needed during the continuing planning process.

5. The Program Review Board. This board has been established to provide guidance on Federal and State policies relating to environmental management. It consists of representatives from the Environmental Protection Agency, the State Water Resources Control Board, the California Air Resources Board, the Governor's Office of Planning and Research, the State Solid Waste Management Board, and the Regional Water Quality Control Board. It has proved to be a useful forum for the various agencies to exchange information in an informal fashion.

Action 1.7 Continue the Program Review Board.

6. Public Participation. In some planning programs it is not uncommon to involve the public only during the public hearing stage, after many key decisions have been made. From the very beginning in developing this plan, major efforts have been made to involve the general public, affected groups and local governments, starting with work program preparation. Workshops, conferences, printed materials, advisory committees and staff presentations are being used to explain the choices to citizens and elected officials. Many of their concerns are reflected in the draft of this plan. Because of the size and complexity of the Bay Area, particular efforts have been made to involve elected officials and staff at the city and county level since they are closer to the individual citizen.

Action 1.8 Continue a broad-based public participation program during the continuing planning process. Special efforts would be made to involve low-income, minority and age-category groups in the program. Adequate time would be allowed for public review and comment to plan amendments and the annual plan update.

7. Procedures. The EMTF Procedures Manual describes the structure of the EMTF and its operating procedures. This manual has been used to ensure that the efforts to prepare the plan are conducive to regular public participation and conducted in an orderly fashion. Parliamentary procedures governing the process of General Assembly action on this

plan in June are now being developed and will be included in the manual. This manual would be used in the continuing planning process.

Action 1.9 Update the EMTF Procedures Manual to guide the continuing planning process.

8. Plan Update. After the completion of the Environmental Management Plan adoption process at the regional level -- that is, after the ABAG General Assembly adoption of an initial plan in June 1978 -- the preparation of the first annual plan update begins. The update considers new issues, but also reviews compliance with the initial plan by implementing agencies. Parts of the initial plan also have to be acted upon by many regulatory agencies:

- Air Resources Board
- Bay Area Air Pollution Control District
- Environmental Protection Agency
- Metropolitan Transportation Commission
- San Francisco Bay Conservation and Development Commission
- San Francisco Bay Regional Water Quality Control Board
- State Department of Health
- State Solid Waste Management Board
- State Water Resources Control Board

The initial plan does not have all portions of the plan acted upon by the agencies that are to carry it out. Thus a key feature in the first annual update of the plan is to report the actions of the various regulatory bodies on the initial plan.

It is desirable that any changes proposed by regulatory agencies on the first and subsequent versions of the Environmental Management Plan be acted upon at the regional level by ABAG. Changes in the initial and subsequent versions of the plan found by regulatory or approving agencies to be desirable or necessary would be "recycled" during the first and subsequent plan updates. Some discretion in this process, however, would also be appropriate. If a time constraint exists, it might take too long for General Assembly action on the change. Therefore, the requested change or condition would be submitted to the ABAG Executive Board, which could:

1. Act on the proposed change with no referral to other committees, or

refer to the Environmental Management Plan policy body for action prior to Executive Board action;
2. Forward the action directly to the State or Federal agencies requesting the change, or

submit the action to the General Assembly.

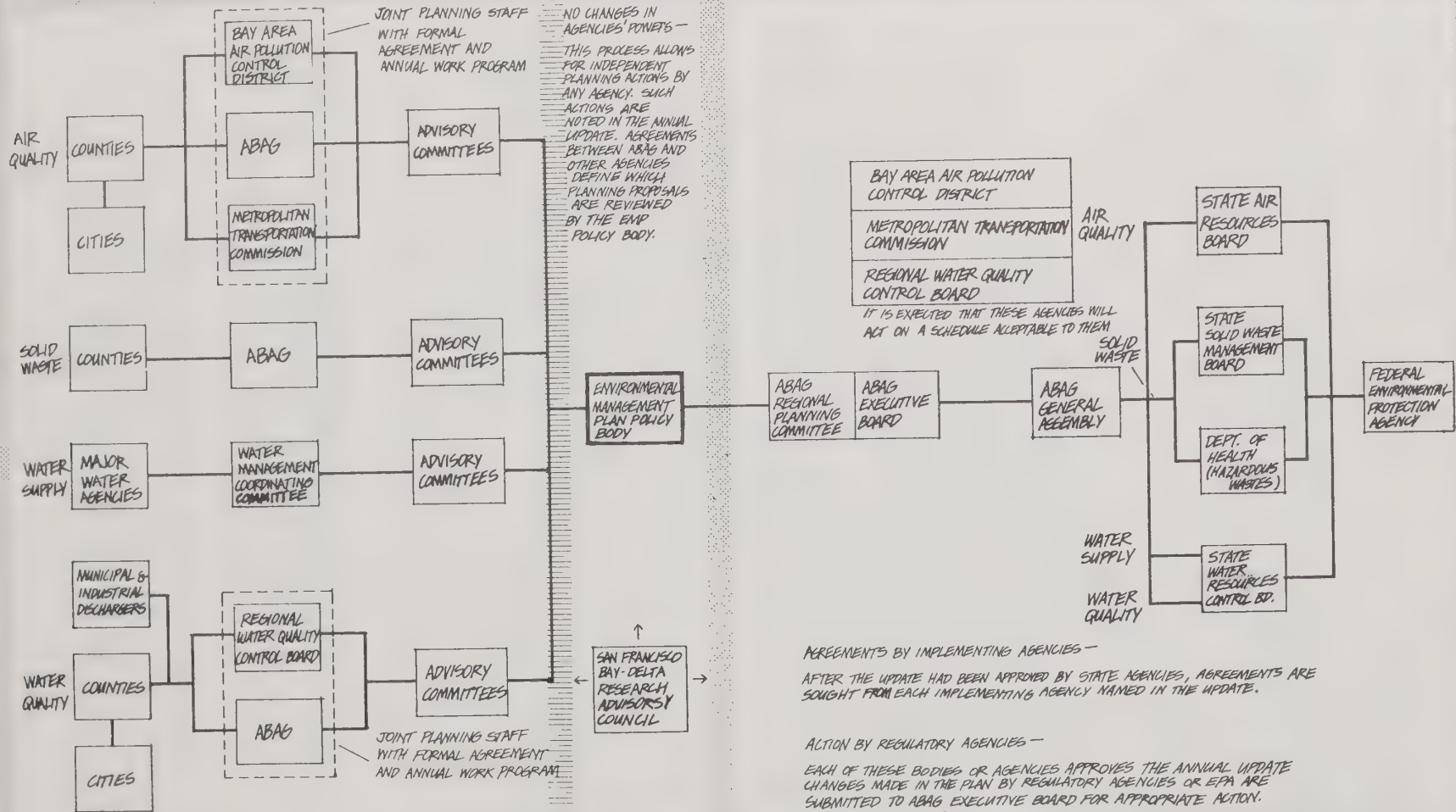
The organization for updating the plan is shown in the chart on the next page. It has the following characteristics:

ENVIRONMENTAL MANAGEMENT CONTINUING PLANNING PROCESS

PREPARATION OF ANNUAL UPDATE

APPROVAL OF ANNUAL UPDATE

91-III-6



CONTENT OF ANNUAL UPDATE -

THE ANNUAL UPDATE CONSISTS OF (1) PROGRESS REPORT ON COMPLIANCE WITH PREVIOUS YEAR'S PLAN (2) UPDATE OF PREVIOUS YEAR'S PLAN (3) SUMMARY OF SIGNIFICANT PLANNING ACTIONS DURING THE YEAR BY ALL AGENCIES.

- It is directed on a continuing basis by the Environmental Management Plan policy body.
- The San Francisco Bay-Delta Research Advisory Council provides research findings.
- A joint water quality planning staff carries out water quality analysis. The staff operates under a formal agreement between ABAG and the Regional Water Quality Control Board and has an annual work program. Staff of municipal and industrial dischargers and city and county agencies participate according to the issue being dealt with.
- A Water Management Coordinating Committee, composed of at least the major water agencies, addresses regional water supply issues.
- Solid waste planning is carried out by ABAG staff with participation by county solid waste staff.
- A joint air quality planning staff carries out air quality analysis. The staff operates under a formal agreement between ABAG, the Bay Area Air Pollution Control District and the Metropolitan Transportation Commission. There is an annual work program. City and county planning and public works departments participate according to the issue being dealt with.
- The EMP policy body considers staff recommendations and approves an updated plan over a period of approximately eight to nine months.
- The Bay Area Air Pollution Control District and the Metropolitan Transportation Commission act on plan recommendations assigned to them on whatever schedule they determine appropriate--either before or after General Assembly action.
- The update goes to the Regional Planning Committee, then to the ABAG Executive Board and finally to the ABAG General Assembly for final action.
- From this point aspects of the update go to the appropriate approving agency. These agencies are:

Air Quality

California Air Resources Board

Solid Waste

California Solid Waste Management Board

California Department of Health Services (Hazardous Waste Measures)

Water Supply

State Water Resources Control Board

Water Quality

Regional Water Quality Control Board (Porter-Cologne Act Requirements)

State Water Resources Control Board

Complete EMP

U.S. Environmental Protection Agency

- Changes to the updated plan proposed by these agencies are submitted to the ABAG Executive Board for approval.

The process relies on a considerable amount of voluntary cooperation among all levels of government. For example, after State agencies approve the plan, agreements are needed with implementing agencies named in the update. These agreements, signed by ABAG and the implementing agency, commit the agency to carry out specified control measures. These agreements provide assurance to EPA that the plan will be implemented.

This process assumes no changes in agencies' powers. It allows for independent planning actions by any agency. Such actions are noted in the annual update. Agreements between ABAG and other agencies define which planning proposals are reviewed by the EMP policy body. Each annual update consists of:

- A progress report on compliance with the previous year's plan.
- Update of the previous year's plan.
- A summary of the significant planning actions during the year by all agencies.

Continuing Planning Process Policy 2 The major purpose of the continuing planning process should be the yearly update of the Environmental Management Plan.

Action 2.1 Include in the annual plan update adopted by the General Assembly the following items:

- A summary of benefits, costs and progress of plan implementation during the preceding year.
- Changes recommended as a result of environmental management actions taken during the preceding year, if necessary.
- Revisions that may be appropriate if Federal or State environmental quality standards are changed or if unanticipated technological advances occur.

- New policies and actions, including governmental and financial recommendations for implementation, as well as an assessment of their economic, social and environmental impacts.
- Recommended response to changes by State, Federal and implementing agencies.
- Formal action on conditions adopted by State or Federal agencies when approving the preceding year's updated plan.

Action 2.2 Include in the Continuing Planning Process an annual status report to the General Assembly from EPA, appropriate State agencies and ABAG on compliance with all applicable Federal and State air quality, water quality and solid waste standards and regulations in metropolitan areas of California and the nation. If it is demonstrated that Federal, State and local governments are not taking all reasonable steps to ensure equitable administration and enforcement of such standards and regulations, ABAG staff shall make recommendations to the Executive Board and General Assembly for modifying control measures of the Environmental Management Plan.

Action 2.3 Take action on appropriate portions of the updated plan (by other regional, State and Federal agencies).

Tasks for the Continuing Planning Process

The specific tasks to be carried out during the continuing planning process are described in the plan chapters, with exceptions noted below. This chapter, however, contains a general policy (with some specific actions) for each management plan element. Further details can be found in the appropriate management plan element.

Continuing Planning Process Policy 3 Regional water quality management planning should be continued.

Action 3.1 Reaffirm water quality objectives for waters of the region. Incorporate the presently adopted objectives for the waters of the region concurrent with approval of the EMP.

Action 3.2 Establish interim standard for delta outflow to bay during winter months.

Action 3.3 Update the water quality element of the Environmental Management Plan. This includes the 20-year project list and the county surface runoff plans.

Continuing Planning Process Policy 4 Continued regional planning for water supply should primarily rest with water supply agencies through the Water Management Coordinating Committee.

Continuing Planning Process Policy 5 Continued planning, as required by Federal and State law, will be necessary for solid waste management.

Action 5.1 Update the regional plan, including municipal wastes, hazardous wastes and wastewater solids.

Continuing Planning Process Policy 6 Regional air quality planning should be continued.

Action 6.1 Update the initial air quality plan to cover other pollutants, including but not limited to sulfur dioxide, carbon monoxide, and particulate matter.

Action 6.2 Review programs made to implement actions to reduce hydro-carbon emissions and determine if reasonable further progress is being made between 1979 and 1982 toward attainment of the Federal oxidant standard.

Action 6.3 Establish a regional industrial siting program for analyzing alternative sites, sizes, production processes and environmental control techniques.

Action 6.4 Evaluate and propose procedures other than case-by-case offset for permitting industrial growth, with consideration given to any potential competitive advantages or disadvantages to the region that could result from implementation of such procedures.

In addition, there is a set of tasks that does not fit into any of the management plan elements. Nevertheless, they are specific enough that they should also be listed.

Continuing Planning Process Policy 7 Continued planning requires the completion of tasks that are integrative among the several management plans.

1. Control measures and their implementing mechanisms would be the subject of continuing assessment for their social, economic and environmental impacts. Conditions change, and differing effects are created. New impacts must be assessed. Also, as more information is available, previously identified impacts will need to be refined. Mitigation measures to deal with the undesirable aspects of control measures will be developed and refined.

Action 7.1 As control measures are refined and updated, conduct a continuing assessment of their social, economic and environmental effects, and develop mitigation measures as appropriate.

2. ABAG has adopted a resolution recommending a study of governmental and financing mechanisms for environmental management planning and implementation beyond the next two years. As for financing, the study should focus on a long-term program for financing environmental management in the Bay Area using a combination of local, State and Federal funds. It should also begin an investigation of the application of pricing policies to supplement direct regulation in environmental management.

In terms of governmental arrangements, EMTF and its Plan Implementation Committee requested that the following governmental organization options be analyzed and recommendations made:

- a. Maintain the status quo.
- b. Return to the cities and counties all environmental management authority.
- c. Maintain existing regulatory agencies while assigning new programs to cities and counties.

- d. Strengthen the planning regulatory authority of single-purpose regional agencies.
- e. Maintain the regulatory authority of existing single-purpose regional agencies but assign air, water and solid waste planning responsibilities to one planning agency that would also develop a regionwide urban growth policy.
- f. Assign to a comprehensive planning agency planning responsibilities noted under "e" above, but also give the agency oversight responsibilities.
- g. Create a new regional agency with planning and regulatory responsibility for air, water, solid waste and/or other environmental concerns.
- h. Strengthen the planning authority of existing State single-purpose environmental agencies or combine them in a new umbrella environmental agency.
- i. Strengthen the Federal role by attaching conditions to all Federal funds allocated to the Bay Area.

The second through the ninth options are described as follows:

Return to the cities and counties all environmental management authority. This option foresees the dismantling of some or all regional environmental decision-making. The assumption under this option is that regional issues can be dealt with under cooperative arrangements between the cities and counties. To carry out this option would require action by the State Legislature.

Maintain existing regulatory agencies while assigning new programs to cities and counties. For example, cities and counties would implement and enforce all surface runoff plans and land use measures related to air quality management recommendations. Because these are regional plans, they would need to be updated on an ad hoc basis under temporary staffing and policy body arrangements. The assumption behind this option is that compliance with any new measures would be voluntary on the part of cities and counties. If the cities and counties did not carry out these controls, Federal and State agencies would enforce the plan.

Strengthen the planning and regulatory authority of single-purpose regional agencies. This option would, for example, place primary responsibility for enforcing the regional surface runoff plan with the Regional Water Quality Control Board. Likewise, land use decisions directly affecting air quality could be ultimately decided by the Air Pollution Control District. Existing single-purpose regional agencies might also assume the planning functions of other regional agencies having a more comprehensive outlook.

Maintain the regulatory authority of existing single-purpose regional agencies but assign air, water, and solid waste planning responsibilities to one planning agency that would also develop a regionwide urban growth policy. This is generally the approach followed by the Environmental Management Task Force. The 208 City Managers' and County Administrators'

Advisory Committee has taken the position that the State Legislature should recognize, by statute, regionwide coordinated planning by San Francisco Bay Area governments, through ABAG, in those areas mandated by the Clean Water Act and the Clean Air Act. This option would need to take into account the fact that plan formulation cannot be completely separated from regulatory decision-making. As the EMP effort moves into the implementation and update phase, implementing and regulatory agencies need a clearer role in the decision-making process.

Assign to a comprehensive planning agency planning responsibilities noted under "e" above but also give the agency oversight responsibilities. The comprehensive agency could review and override actions of regulatory agencies found to be inconsistent with the Environmental Management Plan. The oversight responsibility might also apply to city and county plans or elements of these plans.

Create a new regional agency with planning and regulatory responsibility for air, water, solid waste and/or other environmental concerns. Some or all regional regulatory agencies would be consolidated into one comprehensive environmental management agency. Variations on this option are considerable, given the number of existing regional agencies to work with, but all would require State legislative action.

Strengthen the planning authority of existing State single-purpose environmental agencies or combine them in a new umbrella environmental agency. At the minimum, this option would include the State Water Resources Control Board, the Air Resources Board, and the State Solid Waste Management Board. Many variations are possible. Some would enhance the power of the State and reduce local/regional autonomy.

Strengthen the Federal role by attaching conditions to all Federal funds allocated to the Bay Area. Federal policy would be implemented directly through the carrot and stick approach. The 1977 Clean Air Act Amendments, for example, include the stipulation that Federal highway grants, agency operating grants, and other funds may be withheld if the region does not demonstrate satisfactory progress in implementing Federal air quality standards. Another example is that EPA could require that more stringent growth control mechanisms be instituted as a condition to its release of a wastewater facilities grant.

Action 7.2 Develop and propose governmental and financing mechanisms for planning and implementation beyond the first two years following plan approval.

3. As in the development of the initial plan, integration among the elements of the updated Environmental Management Plan must take place. This ensures internal plan consistency. This activity would be performed on a continuous basis after approval of the initial plan.

Action 7.3 Ensure consistency among the management plan elements.

4. The increasing demand for energy is bound to have an effect on environmental standards, particularly if energy generation facilities are located in the Bay Area. Air quality standards are especially stringent in the region. This situation creates the potential for conflict.

Action 7.4 Examine and develop recommendations for resolving conflicts between energy generation facilities and air quality standards.

Financing the Continuing Planning Process

The continuing planning process, which is required by Federal law, cannot function without funding. The EMTF Plan Implementation Committee reviewed 14 potential sources of revenue for the continuing planning process. These potential sources are summarized as follows:

1. Continued "208" funding from the Environmental Protection Agency.

The money could be used for water quality, water supply and solid waste planning. Should it occur, it is likely that it would be available on a 75 percent basis for two or three years. In other words, a 25 percent "match" from local sources would be required. The initial "208" grant, in contrast, does not require a local match. Several potential sources described below could assist in developing matching funds. The total amount available from EPA is not yet known, but presumably it would be considerably less than the initial grant. Long-term support is unclear.

2. Funding under the 1977 Clean Air Act Amendments

This recently enacted legislation authorizes planning funds for updating the State Implementation Plan. Any such money coming into the Bay Area for continued air quality planning could be shared by ABAG, the Metropolitan Transportation Commission, the Bay Area Air Pollution Control District and other agencies that developed the air quality plan. Under present planning arrangements, ABAG would be the recipient of the funds. Tasks performed would be specified in a work program to be developed. Local matching funds are not required.

3. Funding under the Resource Conservation and Recovery Act (RCRA)

RCRA is a Federal law administered in California by the State Solid Waste Management Board. The State Board will make the determination of how Federal money will be shared by State, regional and local agencies. Money under RCRA can be used for the planning of resource recovery and other solid waste management projects.

4. A portion of the State Litter Control, Recycling and Resource Recovery Fund.

This source of funds, available under California's recently enacted Litter Control, Recycling and Resource Recovery Act of 1977, could be used to maintain and update portions of the solid waste management and surface runoff management recommendations. The fund is to be administered by the State Solid Waste Management Board. Local match is not required.

5. Local government contributions to regional environmental management planning.

This source of funds is through local dues to ABAG. It could generate any amount that is approved and could be used for all continuing planning process. This money could be from existing local dues (but with increased priority for environmental management). Or it could involve increased dues. If local matching funds are required for receipt of a Federal grant--from EPA, for example--this money can be so used.

6. County provision of staff time for surface runoff planning and/or management.

Surface runoff planning by the counties has been financed *out* of the original "208" grant from EPA. Further county planning to update and refine their surface runoff management actions could be partially or completely funded directly by the counties. Technical assistance by local governments could also be rendered in other continuing planning functions. County staff, furthermore, have indicated that this type of local funding is feasible. The provision of such services by county staff can be considered as part of any required local "match."

7. Membership fees from special districts joining ABAG.

The ABAG Executive Board and its Legislation and Governmental Organization Committee have at various times discussed the idea of special district membership in ABAG. Theoretically, the reasons for allowing such memberships could now be considered stronger; if special districts implementing environmental policies became voting members of ABAG, this would ensure a smoother implementation process for those portions of the plan dependent on special district cooperation. An ABAG Bylaws Amendment would be needed to obtain this source of revenue. Amounts generated would depend on the dues rate and eligibility criteria, and it could be used for the local "match."

8. A small increment in the property transfer tax.

Use of the existing property transfer tax to support regional planning has been proposed before. Several legislative attempts to enact such a funding mechanism have been made in the recent past. The total amount of money would depend on the increment level as well as the value of transactions being taxed. A very small transfer tax applied to all property sold in the region would generate three to five times the current total local dues to ABAG.

9. Federal and State funds via the Air Resources Board and/or the Bay Area Air Pollution Control District

Both agencies receive grants from EPA. The district also receives a yearly \$1,000,000 subvention from ARB, and has a property tax. The district, in addition, is now studying the possibility of raising revenues through use of emissions fees. The Air Resources Board also receives a direct State appropriation. At the discretion of ARB and/or the district, any of these monies could be used to support further air quality planning.

10. A small percentage of "201" funds coming into the region.

ABAG has prepared as part of the EMP a 20-year list of municipal wastewater facilities. This list will be used for allocation of Federal subsidies for the planning and construction of these public works. These funds are authorized under the "201" program. Therefore, continued maintenance and updating of this list could logically be funded by this Federal program. A change in Federal and/or State regulations would probably be required.

11. Federal and State funds via the State Water Resources Control Board and/or the San Francisco Bay Regional Water Quality Control Board.

Federal grants and the State budgetary process provide water quality planning money to SWRCB and the Regional Board. Because ABAG is also involved in water quality planning, ABAG could possibly be allowed to share in these funds. To do so would require a change in State regulations.

12. Industrial cost recovery discretionary fund.

Industries that discharge their wastes into municipal treatment facilities must pay back to the wastewater agency their share of construction and operation costs for this additional treatment. Of this money, 90 percent must be used for purposes specified under Federal and State grant regulations. Use of the remaining 10 percent is discretionary with the wastewater agency. Part of it could be used for continued water quality planning activities.

13. Small percentage of regional bridge tolls or State gas tax.

If bridge tolls and gasoline taxes are at a high level, they discourage automobile use. To the extent that people can be lured out of their cars and into public transportation, the region's air quality will improve. Bridge tolls and/or State gas tax funds could be used to maintain and update the appropriate portions of the air quality maintenance plan.

14. State appropriation for regional environmental planning.

The State budget might be amended to include direct funding for regional planning. At the State's discretion, these funds could be used for any planning purpose. Legislation would be required to authorize this.

It is possible, though not likely, that none of these sources of money will be available for continuing the integrated environmental management planning effort in the Bay Area. In response to this possibility, EMTF passed a resolution which reads in part:

"...If funds are not available through EPA or other sources, we recommend that ABAG undertake continuing responsibility for these functions and use whatever powers, including A-95, to ensure compliance."

During the months preceding and following formal plan approval, ABAG staff is developing a work program and budget for the continuing planning process. This program is based on activities and financing mechanisms listed in this chapter. It is important that funding be secured so that the continuity of tasks is not lost and progress on solving the region's environmental problems can be maintained.

Continuing Planning Process Policy 8 Adequate and consistent sources of funds must be made available to finance the continuing planning process, including annual plan update.

Action 8.1 Give high priority attention to the following sources for financing the continuing planning process:

1. Continued funding under the Federal Water Pollution Control Act.
2. Funding under the Clean Air Act Amendments of 1977.
3. Funding under the Resource Conservation and Recovery Act of 1976.

Action 8.2 For the period up to two years following approval of the initial plan, use local sources, including local dues to ABAG, primarily to provide the required matching funds for Federal and/or State planning assistance.

Action 8.3 Develop and recommend a long-term program for financing environmental planning and coordination beyond the initial two-year period using a combination of local, State and Federal funds.

Plan Implementation

recommendations

Plan Implementation recommendations

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 1 THE INITIAL ENVIRONMENTAL MANAGEMENT PLAN SHOULD BE IMPLEMENTED AS MUCH AS POSSIBLE BY EXISTING GOVERNMENTAL AGENCIES USING CURRENT AUTHORITY (The Actions to implement this policy have been incorporated into the individual management plans.)								
Policy 2 FEDERAL AND STATE GOVERNMENTS SHOULD MAKE LEGISLATIVE AND ADMINISTRATIVE CHANGES TO CARRY OUT ENVIRONMENTAL MANAGEMENT PLAN RECOMMENDATIONS, AS NECESSARY								
Action 2.1 Provide additional funding for the California Dept. of Health to establish and carry out regulations for commercial and recreational shellfish harvesting in San Francisco Bay.	This recommendation supports Policy 3 and its actions in the Water Quality Management Plan.	California Legislature	As soon as possible	State Constitution	0	0	State budget	ABAG advocacy
Action 2.2 Enact legislation to require existing marinas and harbors to provide on-shore toilet facilities.	This recommendation supports Policy 10 and its actions in the Water Quality Management Plan.	California Legislature	As soon as possible	State Constitution	0	0	State budget	ABAG advocacy
Action 2.3 Unless preempted by Federal law, enact legislation on liability requirements and compensation to minimize water pollution from oil spills.	This recommendation supports Policy 12 and its actions in the Water Quality Management Plan.	California Legislature	As soon as possible	State Constitution	0	0	State budget	ABAG advocacy
Action 2.4 If determined to be necessary by the time of the first annual revision of the Environmental Management Plan, enact legislation requiring cities and counties to revise and update building codes to include water conservation in new construction.	This recommendation supports Policy 2 and its actions in the Water Supply Management Plan.	California Legislature	As soon as possible	State Constitution	0	0	State budget	ABAG advocacy

PLAN IMPLEMENTATION RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 2.5 Enact legislation providing incentives for water conservation in existing buildings and for agricultural water conservation.	This recommendation supports Policy 2 and its actions in the Water Supply Management Plan.	U.S. Congress; California Legislature	As soon as possible	Federal and State Constitutions	0	0	Federal and State budgets	ABAG advocacy
Action 2.6 Enact legislation to promote waste reduction where appropriate and to support stable, adequate markets for secondary materials and products made from them.	This recommendation supports Policies 6 and 8 of the Solid Waste Management Plan.	U.S. Congress; California Legislature	As soon as possible	Federal and State Constitutions	0	0	Federal and State budgets	ABAG, SSWMB, EPA and local governments advocacy
Action 2.7 Provide increased financial support for job retraining programs for workers displaced by new air quality stationary source control.	This recommendation supports Policy 1 in the Air Quality Plan.	U.S. Congress; California Legislature	1979-81 session	Federal and State Constitutions	0	0	Federal and State budgets	ABAG, BAAPCD advocacy
Action 2.8 Enact legislation to implement a State-wide inspection/maintenance program for light and heavy duty vehicles.	This recommendation supports Policy 2 in the Air Quality Plan.	California Legislature	1979-81 session	State Constitution	0	0	State budget	ABAG advocacy
Action 2.9 Enact legislation to require exhaust control devices on existing heavy duty gasoline vehicles Statewide.	This recommendation supports Policy 2 in the Air Quality Plan.	California Legislature	1979-81 session	State Constitution	0	0	State budget	ABAG advocacy
Action 2.10 Provide additional financial support for local transit operators to substantially increase regional transit service as a means of achieving Federal and State air quality standards.	This recommendation supports Policy 3 in the Air Quality Plan.	U.S. Congress; California Legislature	1979-81 session	Federal and State Constitutions	0	0	Federal and State budgets	ABAG and MTC advocacy
Action 2.11 The ABAG Environmental Management Plan has met stringent standards for air quality. It is possible there may be significant economic and social adjustments. Therefore we request Congress to re-examine the no-risk philosophy and requirements of the Clean Air Act to make them reasonable for local governments seeking to comply.		U.S. Congress	1979-81 session	Federal constitution	0	0	Federal budget	ABAG advocacy

PLAN IMPLEMENTATION RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Action 2.12

Provide necessary funding for local government agencies to carry out regulations and programs outlined in this Plan.

This recommendation supports the capacity of local government to carry on the EMP.

U.S. Congress, California Legislature, and local government based upon future income sources

As needed

Federal and State Constitution.

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Federal and State budgets, local taxing authority and fee setting or assessment ability.

Advocacy by all governments involved in environmental management process.

Policy 3

PLAN IMPLEMENTATION SHOULD BE ENSURED THROUGH THE TIMELY AND APPROPRIATE COMPLETION OF MANAGEMENT AGREEMENTS AS REQUIRED BY FEDERAL REGULATIONS

Action 3.1

Obtain management agreements to implement the policies and actions of appropriate portions of the Environmental Management Plan.

Federal water quality regulations require assurances that the plan will be implemented and indicate the need to secure such agreements.

ABAG, all implementing agencies.

Following General Assembly approval of the initial plan.

Federal Water Pollution Control Act.

Undetermined Undetermined

Federal & State grants; local match if required

Required by Federal regulations under 40 CFR 130

Continuing Planning Process

recommendations

Continuing Planning Process recommendations

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 1 THE PROCESS FOR CONTINUED ENVIRONMENTAL MANAGEMENT PLANNING AND PLAN UPDATE SHOULD BE BASED ON THAT ESTABLISHED FOR THE INITIAL ENVIRONMENTAL MANAGEMENT PLAN								
Action 1.1 Designate ABAG as the lead agency for the Federally required continuing planning process	ABAG would continue its functions as an environmental planning and coordinating agency.	ABAG, State agencies, EPA	1978	Federal Water Pollution Control Act; Clean Air Act; Resource Conservation & Recovery Act; SB 424 (1977)	0	0	-	Federal law requires a continuing planning process
Action 1.2 Establish the required policy advisory body to manage the continuing planning process.	Its size and composition would be determined by the Executive Board.	ABAG	For a period up to two years from the present	ABAG by-laws	\$30,000	\$30,000	Federal & State grants, local match if required	Federal regulation under 40 CFR 130 and 131 require a policy advisory committee.
Action 1.3 Continue joint staff arrangements for air quality planning		ABAG, BAAPCD, MTC, ARB, Caltrans, EPA	ongoing memorandum of understanding in 1978	Clean Air Act as amended	0	0		Section 174, Clean Air Act Amendments of 1977.
Action 1.4 Execute a Memorandum of Understanding to integrate Bay Area water quality planning including the establishment of a joint water quality planning staff similar to that for air quality planning	This staff would be drawn from ABAG and the Regional Water Quality Control Board.	ABAG, San Francisco Bay Regional Water Quality Control Board	1978	Agencies' enabling legislation	Minor administrative cost	Minor administrative cost	Federal & State grants, local match if required	Federal regulations, 40 CFR 130-131 require an integrated process

CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Action 1.5 Execute a Memorandum of Understanding between ABAG and the State Water Resources Control Board	This memorandum would integrate ABAG's grant review function under Circular A-95 with the SWRCB's decision-making responsibilities for 201 wastewater facilities projects.	ABAG, State Water Resources Control Board	1978	Agencies' enabling legislation	minor administrative cost	minor administrative cost	Federal & State grants, local match if required	OMB Circular A-95, Part IV; State Administration Urban Strategy; Clean Water Grant Regulations
Action 1.6 Maintain appropriate technical advisory committees.	They would meet as needed during the continuing planning process.	ABAG, county lead agencies, other committee participants	Ongoing	ABAG by-laws	minor administrative cost	minor administrative cost	Federal & State grants, local match if required	
Action 1.7 Continue the Program Review Board.	ABAG & other agency officials & staff would report on plan update progress.	EPA, SWRCB, RWQCB, ARB, OPR, SSWMB	Ongoing	Agencies' enabling legislation	minor administrative cost	minor administrative cost	Federal & State grants, local match if required	Voluntary on the part of State & Federal agencies
Action 1.8 Continue a broad-based public participation program during the continuing planning process.	Special efforts would be made to involve low-income, minority and age-category groups in the program. Adequate time would be allowed for public review and comment to plan amendments & the annual plan update.	ABAG, and other participating agencies	Ongoing	Federal regulations	\$150,000	\$150,000	Federal & State grants, local match if required	Federal regulations
Action 1.9 Update the EMTF Procedures Manual to guide the continuing planning process for environmental management planning.		ABAG	1978	ABAG by-laws	minor administrative cost	minor administrative cost	Federal & State grants, local match if required	

CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 2

THE MAJOR PURPOSE OF THE CONTINUING PLANNING PROCESS SHOULD BE THE YEARLY UPDATE OF THE ENVIRONMENTAL MANAGEMENT PLAN.

Action 2.1

Include in the annual plan update adopted by the General Assembly, the following items:

- o A summary of benefits, costs and progress of plan implementation during the preceding year.
- o Changes recommended as a result of environmental management actions taken during the preceding year, if necessary.
- o Revisions that may be appropriate if Federal or State environmental quality standards are changed or if unanticipated technological advances occur.
- o New policies and actions, including governmental and financial recommendations for implementation as well as an assessment of their economic, social and environmental impacts.
- o Recommended response to changes by State, Federal and implementing agencies.
- o Formal action on conditions adopted by State or Federal agencies when approving the preceding year's updated plan.

ABAG

yearly, starting in 1979

Federal Water Pollution Control Act, Clean Air Act Amendments, Resource Conservation & Recovery Act, SB 424 (1977)

Undetermined

Undetermined

Federal & State grants, local match if required

Federal and State law and regulations

Action 2.2

Include in the Continuing Planning Process an annual status report to the General Assembly from EPA, appropriate State agencies and ABAG on compliance with all applicable Federal and State air quality, water quality and solid waste standards and regulations in metropolitan areas of California and the nation. If it is demonstrated that Federal, State and local governments are not taking all reasonable steps to ensure equitable administration and enforcement of such standards and regulations, ABAG staff shall make recommendations to the Executive Board and General Assembly for modifying control measures of the Environmental Management Plan.

ABAG

Yearly, starting in 1979

Federal Water Pollution Control Act, Clean Air Act Amendments, Resource Conservation & Recovery Act, SB 424 (1977)

Undetermined

Federal & State grants, local match if required

Action 2.3

Take action on appropriate portions of the updated plan

MTC, BAAPCD, RWQCB, SWRCB, SSNMB, ARB, EPA, Dept. of Health

yearly, starting in 1979

Enabling legislation

Undetermined

Undetermined

Federal & State budgets

Federal and State law

CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
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Policy 3

REGIONAL WATER QUALITY MANAGEMENT PLANNING SHOULD BE CONTINUED

Action 3.1

Reaffirm water quality objectives for waters of the region. Incorporate the presently adopted objectives for the waters of the region concurrent with approval of the EMP.	Water quality objectives designed to protect beneficial uses are the foundation of the water quality management plan. Adequate water quality standards must be established and maintained. Beneficial use designations and water quality objectives for the region as adopted by SWRCB and RWQCB are shown in Section 8 of that plan. The objectives are identical to current objectives. All water projects proposed within the Bay-Delta system should require proof of nondetrimental impact on water quality.	ABAG	1978	Federal Water Pollution Control Act and Porter-Cologne Act.	0	0	-	State and EPA review.
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Action 3.2

Establish interim standard for delta outflow to Bay during winter months.	To ensure that sufficient wintertime flood flows enter the bay, it is recommended that an interim standard be established and that research by SFBDRAC be designed to develop a basis for final standards.	SWRCB	June 1978		0	0		
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Action 3.3

Update the water quality element of the EMP	This includes the 20-year project list and the county surface runoff plans.	ABAG, RWQCB, county lead agencies	Annually from 1979	Federal Water Pollution Control Act, Porter-Cologne Act	Undetermined	Undetermined	Federal & State grants, local match if required	Required by law
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Policy 4

CONTINUED REGIONAL PLANNING FOR WATER SUPPLY SHOULD PRIMARILY REST WITH WATER SUPPLY AGENCIES THROUGH THE WATER MANAGEMENT COORDINATING COMMITTEE

The following study tasks are those which the Water Management Coordinating Committee is requested to consider:

1. Evaluate the advantages and disadvantages of increased interagency water transfer.
2. Evaluate the costs and benefits of accepting restrictions on water use during droughts.
3. Evaluate need for new water supply projects, including interties, prior to 1985 giving priority to water conservation and reclamation.
4. Prepare a drought contingency plan.
5. Conduct survey of status, use, and plans for all groundwaters in region.
6. Prepare regional groundwater basin management plan.
7. Evaluate the quality of water for domestic use including an examination of the effect of further withdrawals of freshwater from the delta and impacts which percolation of imported water may have on quality of underground water supplies in the region.

Policy 5

CONTINUED PLANNING, AS REQUIRED BY FEDERAL AND STATE LAW, WILL BE NECESSARY FOR SOLID WASTE MANAGEMENT

Action 5.1

Update the regional plan, including municipal wastes, hazardous wastes and wastewater solids.	Update the regional solid waste management plan, incorporating results of ongoing planning activities of other state, regional and local agencies, and including more detailed planning for regional issues.	ABAG	1979 and annually thereafter	Federal Water Pollution Control Act, SB 424 (1977), Resource Conservation and Recovery Act	Costs are included in Action 1.2 of the Solid Waste Management Plan		Federal & State grants, local match if required	Existing EPA and State SWMB requirements will ensure plan update
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CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

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Policy 6 REGIONAL AIR QUALITY PLANNING SHOULD BE CONTINUED								
Action 6.1 Update the initial air quality plan to cover other pollutants, including but not limited to sulfur dioxide, carbon monoxide, and particulate matter.	This covers the other pollutants where potentially serious air quality problems exist in the region.	ABAG, BAAPCD, MTC, ARB, Caltrans, cities and counties	October 1978	Clean Air Act as amended	Undetermined	Undetermined	Federal & State grants, local match if required	Clean Air Act as amended
Action 6.2 Review programs made to implement actions to reduce hydrocarbon emissions and determine if reasonable further progress is being made between 1979 and 1982 toward attainment of the Federal oxidant standard.		ABAG, BAAPCD, MTC, ARB, Caltrans, cities and counties	1979 and annually thereafter	Clean Air Act as amended	Undetermined	Undetermined	Federal & State grants, local match if required	Clean Air Act as amended
Action 6.3 Establish a regional industrial siting program for analyzing alternative sites, sizes, production processes and environmental control techniques.	This is required by the Clean Air Act Amendments of 1977 if the region cannot attain the Federal oxidant standard by 1982 and is to be granted an extension to 1987.	ABAG (with RPC involvement), MTC, ARB, Caltrans, cities and counties, BAAPCD.	1979	Clean Air Act as amended	Undetermined	Undetermined	Federal & State grants, local match if required	Clean Air Act as amended
Action 6.4 Evaluate and propose procedures other than case-by-case offset for permitting industrial growth, with consideration given to any potential competitive advantages or disadvantages to the region that could result from implementation of such procedures.		ABAG, BAAPCD, ARB, cities and counties.	1979 and annually thereafter	Clean Air Act as amended	Undetermined	Undetermined	Federal & State grants, local match if required	Clean Air Act as amended

CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 7 CONTINUED PLANNING REQUIRES THE COMPLETION OF TASKS THAT ARE INTEGRATIVE AMONG THE SEVERAL MANAGEMENT PLANS								
Action 7.1 As control measures are refined and updated, conduct a continuing assessment of their social, economic and environmental effects, and develop mitigation measures as appropriate.		ABAG	Continuous after approval of the initial plan	Federal law	Undetermined	Undetermined	Federal & State grants, local match if required	Required by law
Action 7.2 Develop and propose governmental and financing mechanisms for planning and implementation beyond the first two years following plan approval.		ABAG (L&GO Committee to have lead responsibility.)	June 1979	Adopted by EMTF and its Plan Implementation Committee	Undetermined	Undetermined	Federal & State grants, local match if required	
Action 7.3 Ensure consistency among the management plan elements.		ABAG	Continuous after approval of the initial plan	ABAG by-laws	Undetermined	Undetermined	Federal & State grants, local match if required	
Action 7.4 Examine and develop recommendations for resolving conflicts between energy generation facilities and air quality standards		ABAG (with RPC involvement), BAAPCD, County SWM agencies, energy project proponents.	1979	Agencies' enabling legislation	Undetermined	Undetermined	Federal & State grants, local match if required	

CONTINUING PLANNING PROCESS RECOMMENDATIONS (continued)

RECOMMENDATIONS	GENERAL DESCRIPTION	RESPONSIBLE AGENCY (OR AGENCIES)	SCHEDULE FOR ACTION	LEGAL AUTHORITY	TOTAL COST/YEAR OF RECOMMENDED ACTION	PORTION OF TOTAL COST/YR. DIRECTLY ATTRIBUTABLE TO THIS PLAN	FINANCING MECHANISM	MEASURES TO ENSURE IMPLEMENTATION
Policy 8 ADEQUATE AND CONSISTENT SOURCES OF FUNDS MUST BE MADE AVAILABLE TO FINANCE THE CONTINUING PLANNING PROCESS, INCLUDING ANNUAL PLAN UPDATE.								
Action 8.1 Give high priority attention to the following sources for financing the continuing planning process: 1) continued funding under the Federal Water Pollution Control Act, 2) funding under the Clean Air Act Amendments of 1977, 3) funding under the Resource Conservation and Recovery Act of 1976.		ABAG (Fin. & Pers. Committee to have lead responsibility).	Ongoing	Federal Water Pollution Control Act, Clean Air Act, Resource Conservation and Recovery Act	-	-	-	Federal law required a continuing planning process
Action 8.2 For the period up to two years following approval of the initial pla, use local sources, including local dues to ABAG, primarily to provide the required matching funds for Federal and/or State planning assistance.		ABAG	Ongoing	ABAG by-laws, other law governing local sources	-	-		Federal & State grants, local match if required
Action 8.3 Develop and recommend a long-term program for financing environmental planning and coordination beyond the initial two-year period using a combination of local, State and Federal funds.		ABAG (Fin. & Pers. Committee to have lead responsibility)	March 1979	ABAG by-laws	Undetermined	Undetermined		Federal & State grants, local match if required

Affirmative Action

recommendations

AFFIRMATIVE ACTION POLICIES

Policy 1: Propose to Federal, State and local governments a regional approach for the coordination of the various affirmative action activities which would assist local governments and implementing entities in their efforts to meet affirmative action standards applicable to the Environmental Management Plan.

Action 1.1: Request that the Federal Regional Council and Federal Executive Board participate with ABAG, appropriate State agencies, regional agencies involved in the Environmental Management Plan, and local governments, in developing procedures for the coordination of all grants and contracts awarded by Federal, State and local governments which provide assistance to affected groups (minorities, women, etc.) for business development and manpower training.

The goals of such procedures would be to:

- a. Improve the flow of information regarding minority* business development and manpower training to local governments and implementing agencies charged with meeting Federal, State, and local affirmative action standards.
- b. Simplify and improve coordination of affirmative action efforts by various levels of government which are designed to assist minorities in availing themselves of opportunities created by the inclusion of affirmative action measures in the Environmental Management Plan.
- c. Increase the positive impact on minorities resulting from affirmative action activities, through coordination of those activities with the continuing planning and implementation process of the Environmental Management Plan.

Policy 2: Provide a regional data base that contains pertinent information on current business and employment opportunities as well as future projections on the availability of such opportunities resulting from the implementation of programs and control measures of the Environmental Management Plan.

Action 2.1: Develop methods for centralizing the collection and dissemination of information regarding employment and minority entrepreneurial opportunities which result from Environmental Management Plan activities. This could be done in conjunction with the State Employment Development Department and regionwide, private non-profit organization, and community action agencies.

* For purpose of this policy statement an affected group is also implied in the term minority.

Policy 3: Improve monitoring of affirmative action programs and activities by local governments and implementing agencies that have been assigned responsibilities to carry out the Environmental Management Plan.

Action 3.1: Request by ABAG that cities, counties, special districts and relevant regional agencies each designate appropriate department(s) or individual(s) to be assigned monitoring responsibilities for affirmative action compliance in program or projects implemented in conjunction with the Environmental Management Plan.

Policy 4: Include the affirmative action monitoring units designated by public agencies in the A-95 review process for all Federally funded plans and projects designed to implement the Environmental Management Plan.

Action 4.1: Require ABAG clearinghouse staff to submit to designated department(s) or individual(s) in local and regional agencies, a list of potential regional affirmative action issues and the staff's assessment of the effects of those issues for all Environmental Management Plan projects which require A-95 review. The departments or persons would be invited to comment on the affirmative action implication of the project. Where such comments are negative, ABAG's clearinghouse staff would work with the agency involved to attempt to reduce the potential conflict or would include such comments in the overall assessment of the project.

Policy 5: Include review of progress in meeting affirmative action regulations as an integral part of the annual review of actions taken to carry out the Environmental Management Plan.

Action 5.1: Identify private and public service organizations whose principal activities involve civil rights for minorities or other groups covered by affirmative action requirements (e.g. women, handicapped, veterans, etc.), and whose activities are regional in scope, and include such organizations in the review and evaluation of the impact of regional affirmative action efforts.

Action 5.2: Appoint a regional affirmative action coordinating advisory committee consisting of representatives from the officially designated affirmative action agencies and representatives from regional civil rights and ethnic minority organizations as deemed appropriate--except that in no case would private representatives constitute a majority. This committee would meet periodically with ABAG staff to review progress and advise the regional agency on affirmative action problems of regional significance.

Action 5.3: The coordinating committee, acting as an Affirmative Action Task Force, shall study the affirmative action needs of the region in this critical area of environmental management planning. ABAG staff shall provide sufficient staff support to perform the study. The findings and recommendations shall be presented to the ABAG Executive Board for consideration and action.

Policy 6: Minimize social and economic impacts on minorities.

Action 6.1: Encourage implementing agencies to consider affirmative action implication of projects. Attention should be given to possible economic and social disruption in communities where high concentration of minorities and poor persons reside. If such projects are necessary, ABAG should encourage and assist local governments in using every effort possible to minimize predictable negative impacts.

Action 6.2: Provide for an ongoing assessment of the economic and social relationship between housing choices and job location to prevent disproportionate long-distance home-to-job travel by minorities caused by plan recommendations for shifts in land use policy.

Action 6.3: Eliminate or reduce to an acceptable minimum negative social and economic impacts on housing conditions, costs and patterns. Conduct environmental programs so that potential housing problems and negative housing impacts can be anticipated and eliminated whenever possible through mitigation measures.

Policy 7: When the scarcity of a resource, such as water, requires rationing, encourage the use of per capita allocations as opposed to percentage cutbacks to avoid disproportionate impact on low and moderate income people.

Policy 8: Improve information flow and involvement among minority community in environmental matters.

Policy 9: Increase minority career opportunities generated by environmental management programming.

Action 9.1: Coordinate with the various educational training centers to ensure that information on job opportunities resulting from environmental management are incorporated into these programs.

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